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To cite this article: Amir Rezaei Ardani, Fatemeh Tara, Sara Naghizadeh Kashani, Seyedeh Behnaz Hatami, Maryam Emadzadeh & Mahsa Nahidi (2020): Is gestational hypertension associated with affective temperaments?, Hypertension in Pregnancy, DOI: [10.1080/10641955.2020.1749279](https://doi.org/10.1080/10641955.2020.1749279)

To link to this article: <https://doi.org/10.1080/10641955.2020.1749279>



Published online: 03 Apr 2020.



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Is gestational hypertension associated with affective temperaments?

Amir Rezaei Ardani^a, Fatemeh Tara^b, Sara Naghizadeh Kashani^a, Seyedeh Behnaz Hatami ^a, Maryam Emadzadeh^c, and Mahsa Nahidi ^a

^aPsychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran; ^bDepartment of Obstetrics and Gynecology, Mashhad University of Medical Sciences, Mashhad, Iran; ^cClinical Research Unit, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

ABSTRACT

Objective: Gestational hypertension (GH) is an important pregnancy complication. Sparse studies have shown a correlation between this complication and psychological disorders in patients. In this study, we aimed to assess the possible association between affective temperaments and GH. **Methods:** This cross-sectional study was conducted on women with GH hospitalized in hospitals affiliated with Mashhad University of Medical Sciences, compared with healthy women admitted for normal delivery in the same centers during the study. Data were collected via Temperament Evaluation of Memphis, Pisa, Paris, and San Diego-Auto-questionnaire (TEMPS-A) and Depression Anxiety Stress Scale (DASS) 21.

Results: TEMPS-A revealed that scores anxious ($P < 0.001$) temperament was significantly higher in GH patients than in controls. Anxious temperament scores ≥ 9 were independently associated with GH (odds ratio = 2.768, 95% confidence interval = 1.586–4.832; $P < 0.001$). Moreover, the mean depression, anxiety, and stress scores in DASS-21 were significantly higher in the GH patients compared with controls ($P = 0.014$, $P < 0.001$, $P < 0.001$, respectively).

Conclusion: Affective temperaments, particularly anxious temperament, can be potentially involved in the development of GH and its cardiovascular risk during pregnancy.

ARTICLE HISTORY

Received 27 February 2020

Accepted 25 March 2020

KEYWORDS

Affective temperaments;
TEMPS-A; DASS-21;
gestational hypertension

Introduction

Gestational hypertension (GH), defined as blood pressure rises $>140/90$ mmHg for the first time after the 20th week of gestation without proteinuria (1), complicates about 6–10% of pregnancies and is increasingly more commonly encountered (2). It causes major mortality and morbidity in both mother and fetus, imposing a huge economic burden on the health-care system and having detrimental social effects as well (3,4). Although the underlying etiology of GH is not clearly understood (5), studies have reported factors such as age of 40 years or older, nulliparity, obesity, personal or family history of preeclampsia, and preexisting vascular disease to be involved in the risk of developing GH (6).

The Akiskal's theory of affective temperaments is an important theoretical area in the study of personality that focuses on the differences between people (7). According to this theory, affective disturbances manifest in a spectrum ranging from normal emotional reactivity types that benefit the person to disabling severe affective disorders (8). Temperaments, defined as temporally stable

biological cores of personality, are categorized into five major types in Akiskal's model: anxious, cyclothymic, depressive, hyperthymic, and irritable (7,9).

Several studies have shown a bidirectional association between psychological disorders, especially temperaments, and GH. On the one hand, for instance, hypertensive disease during the pregnancy period has been associated with abnormal affective temperaments in the born child (10,11). On the other hand, psychological conditions can present as risk factors for the development of GH and pregnancy-related hypertensive disorders (12–14).

Growing evidence suggests that there is a link between affective temperaments and many psychological and medical conditions (15–19). Having been associated with hypertension, affective temperaments are emerging as potential risk factors in cardiovascular morbidity (20). The association of affective temperaments with pregnancy and its complications has drawn compelling interest (21,22). This study was performed to investigate the possible association between affective temperaments and GH.

Materials and methods

Study setting and ethics

This cross-sectional study was conducted in the Obstetrics and Gynecology wards of Imam Reza and Ghaem hospitals, affiliated with Mashhad University of Medical Sciences, between January and March 2019. Informed written consent was obtained from all participants and the study was approved by the Ethics Committee of the Medical School, Mashhad University of Medical Sciences (Approval Number: IR.MUMS.fm.REC.1396.71).

Study population

One hundred and twenty pregnant women with GH who met our inclusion criteria were selected using nonrandom convenience sampling and included in the study as the patients (case) group. The inclusion criteria were as follows: Iranian nationality, being 18–35 years, minimum education of at least middle school, being accessible via telephone, singleton pregnancy, definitive diagnosis of GH, and written consent for participation.

The diagnosis of GH was made via medical history and clinical examination by an expert gynecologist in all patients, according to the National Obstetric Care Guideline (23). In this regard, GH was diagnosed in pregnant women if they were at >20th week of gestation and had a blood pressure of 140/90 mmHg or above (measured at least two times in a minimum 6-h period).

Moreover, 120 matched women with uneventful and low-risk pregnancies who referred to the Obstetrics and Gynecology wards of Imam Reza and Ghaem hospitals for their normal delivery and had no gestational complications were selected through nonrandom convenience sampling and included in the study as the control group. The control group was matched with the patients in terms of age, educational status, and parity.

Participants were excluded if they had any of the following: hypertension or diabetes before pregnancy, history of recurrent miscarriages or stillbirth, family history of GH or preeclampsia in their first-degree relatives, major traumatic event in the past 6 months, smoking, alcohol or substance use, and obesity (body mass index >30). We also excluded subjects who used medications raising the risk of inducing GH or preeclampsia and those with significant physiological (cardiac, renal, pulmonary, autoimmune, thyroid, connective tissue, or thrombophilic disorders) or neuropsychological (depression, anxiety, obsession, epilepsy, migraine, myasthenia gravis, or multiple sclerosis) conditions. Furthermore,

participants who developed gestational diabetes or major traumatic events during the study, as well as those who declined to continue the study were excluded.

Data collection

After informing the participants of the objective and the process of research, informed written consent was obtained from all of them. Then, complete medical history and physical examination were performed for all subjects as baseline evaluation.

Demographic data including age, educational status, gestational age, and parity were recorded in checklists. Main outcomes were measured using validated Persian versions of Temperament Evaluation of Memphis, Pisa, Paris, and San Diego-Auto-questionnaire (TEMPS-A) and Depression Anxiety Stress Scale 21 (DASS-21) (24,25).

TEMPS-A is a 110-item measure that assesses affective temperaments in five dimensions. Items 1–21 represent depressive temperament, items 22–42 stand for cyclothymic temperament, items 43–63 indicate hyperthymic temperament, while irritable temperament is represented by items 64–84 and items 85–110 indicate anxious temperament. Each item is answered either “yes” or “no” and scored 1 or 0, respectively. The total score of each temperament is calculated by summing up all scores in its subdomain (8,24).

DASS-21, which is a short version of the 42-item DASS questionnaire, comprises 21 items, each one is scored 0 (None), 1 (Mild), 2 (Moderate), and 3 (High). It is widely used to measure the psychological burden in manifold medical conditions through an assessment of three entities: depression, anxiety, and stress, each evaluated by seven questions. Depression scores of 0–9, 10–13, 14–20, 21–27, and 28–42 identified normal, mild, moderate, severe, and extremely severe depression, respectively. Anxiety scores of 0–7, 8–9, 10–14, 15–19, and 20–42 were considered as normal, mild, moderate, severe, and extremely severe, respectively. Stress scores of 0–14, 15–18, 19–25, 26–33, and 34–42 were indicative of normal, mild, moderate, severe, and extremely severe, respectively (25,26).

Statistical analysis

Data were analyzed using SPSS (version 22 for Windows, IBM Statistics, USA). Descriptive statistics were used to present the data in tables and graphs. Kolmogorov–Smirnov test was used to assess data normality. Independent samples *T*-test, Mann–Whitney test, Chi-square test, and Kruskal–Wallis test were used to compare data between groups of participants. A binary logistic regression model was used to identify the parameters

that possibly contribute to the development of GH. Spearman correlation test was applied to assess the correlations between different quantitative variables. $P < 0.05$ was considered as statistically significant.

Results

Demographic characteristics

Overall, 240 pregnant women in two groups of GH patients ($N = 120$) and control subjects ($N = 120$) were studied. Mean age was 25.98 ± 4.40 years and mean gestational age was 38.73 ± 1.46 weeks. Demographic characteristics of the two groups are compared in Table 1. As the table implies, the groups had no significant differences regarding age, parity, and education, but were significantly different in terms of gestational age ($P < 0.001$).

Affective temperaments

Assessment of the study groups using TEMPS-A revealed that the GH group had significantly higher scores in anxious ($P < 0.001$) temperament. However, no significant difference was observed between groups regarding cyclothymic, depressive, hyperthymic, and irritable temperaments (Table 2).

Depression, anxiety, and stress

The GH group showed significantly higher scores in all three domains of depression ($P = 0.011$), anxiety ($P < 0.001$), and stress ($P < 0.001$) based on the results of DASS-21 questionnaire, compared with the control group (Table 3).

Table 1. Demographic characteristics of the study groups.

Variable	Controls ($N = 120$)	Patients ($N = 120$)	P
Age (years)	25.51 ± 4.22	26.45 ± 4.54	0.101*
Gestational age (weeks)	39.06 ± 1.13	38.40 ± 1.67	0.002*
Parity			0.787**
Nulliparous	43 (35.8%)	41 (34.2%)	
Multiparous	77 (64.2%)	79 (65.8%)	
Education			0.243**
Elementary	40 (33.3%)	50 (41.7%)	
Diploma	57 (47.5%)	55 (45.8%)	
Bachelor or higher	23 (19.2%)	15 (12.5%)	

*Independent samples T -test was used. **Chi-square test was used.

Table 2. Comparison of main outcomes between the study groups.

Affective temperaments	Controls ($N = 120$)	Patients ($N = 120$)	P^*
Anxious (%)	5.00 (3.00–8.75)	8.00 (5.00–11.00)	<0.001
Cyclothymic (%)	7.00 (4.00–9.00)	7.00 (4.25–10.00)	0.076
Depressive (%)	6.50 (4.00–11.00)	6.50 (5.00–12.00)	0.872
Hyperthymic (%)	9.00 (7.00–12.00)	10.00 (8.00–13.00)	0.056
Irritable (%)	1.00 (0.00–3.00)	1.50 (1.00–3.75)	0.191

*Mann–Whitney test was used.

Table 3. Comparison of depression, anxiety, and stress between the study groups.

Domain	Controls ($N = 120$)	Patients ($N = 120$)	P^*
Depression	6.00 (2.00–14.00)	12.00 (4.00–22.00)	0.011
Normal	66 (55.0%)	46 (38.3%)	0.001
Mild	21 (17.5%)	21 (17.5%)	
Moderate	19 (15.8%)	20 (16.7%)	
Severe	13 (10.8%)	26 (21.7%)	
Extremely severe	1 (0.8%)	7 (5.8%)	
Anxiety	4.00 (2.00–10.00)	8.00 (4.00–16.00)	<0.001
Normal	70 (58.3%)	45 (37.5%)	<0.001
Mild	18 (15.0%)	18 (15.0%)	
Moderate	21 (17.5%)	19 (15.8%)	
Severe	8 (6.7%)	24 (20.0%)	
Extremely severe	3 (2.5%)	14 (11.7%)	
Stress	10.00 (4.00–16.00)	18.00 (10.00–28.00)	<0.001
Normal	67 (55.8%)	44 (36.7%)	<0.001
Mild	28 (23.3%)	20 (16.7%)	
Moderate	20 (16.7%)	17 (14.2%)	
Severe	3 (2.5%)	26 (21.7%)	
Extremely severe	2 (1.7%)	13 (10.8%)	

*Mann–Whitney test was used.

The distribution of subjects among different severities of depression ($P = 0.001$), anxiety ($P < 0.001$), and stress ($P < 0.001$) according to DASS-21 questionnaire was also significantly different, with the GH group having significantly higher number of subjects in higher severities, compared with the controls (Table 3).

Inter-variable associations and correlations

Mann–Whitney and Kruskal–Wallis tests showed that parity and education, respectively, had no significant association with any of the TEMPS-A temperaments or DASS-21 domain scores ($P > 0.05$). Likewise, Spearman's correlation showed that neither maternal age nor gestational age had any significant correlations with the TEMPS-A temperaments or DASS-21 domain scores ($P > 0.05$).

Adjusting for traditional risk factors of GH, namely age and nulliparity, using a binary logistic regression model we found that a score of 9 or higher for anxious temperament in TEMPS-A was significantly associated with GH ($P < 0.001$) with an odds ratio of 2.768 (95% confidence interval = 1.586–4.832).

Depression score was significantly correlated with depressive ($r = 0.537$; $P < 0.001$), cyclothymic ($r = 0.436$; $P < 0.001$), irritable ($r = 0.346$; $P < 0.001$), and anxious ($r = 0.389$; $P < 0.001$) temperaments. Anxiety score was significantly correlated with depressive ($r = 0.318$; $P < 0.001$), cyclothymic ($r = 0.381$; $P < 0.001$), irritable ($r = 0.283$; $P < 0.001$), and anxious ($r = 0.505$; $P < 0.001$) temperaments. Stress score was significantly correlated with all the five temperaments, namely hyperthymic ($r = 0.191$; $P = 0.005$), depressive ($r = 0.345$; $P < 0.001$), cyclothymic ($r = 0.366$; $P < 0.001$), irritable ($r = 0.275$; $P < 0.001$), and anxious ($r = 0.564$; $P < 0.001$).

Discussion

As compiling evidence suggests that there is a psychological aspect to several medical conditions, Akiskal's affective temperaments are emerging as a helpful tool in identifying the risk components of developing different medical conditions, especially those with complex and unknown pathophysiology (16,27).

With respect to the growing attention toward the application of affective temperaments in the assessment of psychological and medical conditions, we investigated the association between the affective temperaments and GH. We found significantly higher scores of anxious temperament in GH patients, compared with control pregnant women. On the other hand, we observed no associations between affective temperaments and age, education, or parity.

We also found that high scores of anxious temperament in TEMPS-A could be an independent risk factor for GH in the absence of other traditional risk factors. Anxious temperament scores of nine or higher were significantly associated with a 2.7 times higher risk of GH.

Several studies have reported associations between affective temperaments and cardiovascular risk factors, particularly hypertension. For instance, Eroy et al. in their cross-sectional study, assessed 179 hypertensive patients without diagnosed depression and healthy controls using TEMPS-A. They found a significant association between dominant cyclothymic temperament and hypertension, which remained significant after adjustment for age, diabetes mellitus and obesity. Their findings indicated a somewhat 12-fold higher risk of hypertension in patients with dominant cyclothymic temperament (20).

Another cross-sectional study by László et al. on 173 hypertensive patients without depression assessed the possible role of affective temperaments in cardiovascular risk factors, especially hypertension, using TEMPS-A. Their results indicated high blood pressure in subjects with high cyclothymic temperament and high-level arterial stiffening among patients with low hyperthymic temperament. They reported cyclothymic temperament as an independent indicator of diastolic blood pressure, depression, and anxiety (28).

Taken together, these studies suggest a potential role for affective temperaments especially in the development of hypertension and its underlying pathologies like atherosclerosis, emerging as new factors involved in cardiovascular risk.

To the best of our knowledge, studies have sparsely examined the association of pregnancy complications and affective temperaments and no study has exclusively investigated it in GH patients (22,29). However, Bahadırılı et al. have recently assessed the association of affective

temperaments with the severity of nausea and vomiting symptoms using TEMPS-A, early in gestation. They found anxious, cyclothymic, depressive, and irritable temperament traits to be significantly higher among the patients with nausea and vomiting, compared with control pregnant women. Anxious temperament was significantly associated with nausea and vomiting symptoms in early pregnancy (21).

In accordance with our findings, their results indicate a higher risk for developing pregnancy complications, e.g., nausea and vomiting during pregnancy in women with a predominant anxious temperament (21). Considering these findings and those of the present study, we can hypothesize that predominance of particular temperament, especially anxious temperament, can raise the chance of developing somatic complications like GH or nausea and vomiting during pregnancy. The association between temperament and pregnancy-related complications such as GH could be a result of some psychosomatic etiologies in pregnancy, which needs to be fully elucidated by further research.

We showed that GH patients had significantly higher scores and intensities of depression, anxiety, and stress, compared with the control group. Moreover, our results indicated that depression, anxiety, and stress were significantly correlated with almost all of the affective temperaments. These findings are in line with those of several previous studies that report a link between anxiety, depression, and GH, together with shedding light on our understanding of the psychological aspect of GH (30–32).

Our findings underline the importance of psychological aspects of medical conditions, especially during pregnancy. It can be stated that certain affective temperaments, as found in this study, can be potentially involved in the development of pregnancy complications such as GH. It is therefore important to consider psychological aspects like affective temperaments when counseling women who seek pre-pregnancy care. Furthermore, this and future similar studies can provide evidence for the feasibility of psychological interventions and their possible preventive role against complications such as GH in pregnant women.

Our study had limitations. First, its cross-sectional design cannot help with the underlying mechanisms and possible etiologies behind GH development. Moreover, the majority of our patients were in their final weeks of gestation. Assessment of this relationship in patients who are in different trimesters of pregnancy can provide results that are more comprehensive.

In conclusion, we can state that affective temperaments, in particular, anxious temperament can be potentially involved in the development of GH and its cardiovascular risk during pregnancy. Therefore, it can be beneficial to

closely monitor patients with high-risk affective temperament profiles for GH and possibly prevent further complications that can affect both the mother and the fetus.

Acknowledgments

This study is based on a thesis by Dr. Sara NaghizadehKashani (study number: 951514). The authors wish to thank the Vice Chancellor for Research, Mashhad University of Medical Sciences for their financial support of the study.

Disclosure statement

The authors declare that there is no conflict of interest.

Funding

This work was supported by the Vice Chancellor for Research, Mashhad University of Medical Sciences [951514].

ORCID

Seyedeh Behnaz Hatami  <http://orcid.org/0000-0002-5107-0856>

Mahsa Nahidi  <http://orcid.org/0000-0002-5743-661X>

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