Original Article

Effects of Pregnancy Specific Anxiety on Pregnancy Outcome

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Abstract

Objectives: To evaluate the effects of Pregnancy Specific Anxiety (PSA) on Pregnancy outcome.
Methodology: A cross-sectional, observational study was conducted at department of Physiology LUMHS Jamshoro in collaboration with department of Gynae & Obs LUMHS, from February 2022 to July 2022. Pregnant women with singleton pregnancy during 3rd trimester, regularly attending OPD/antenatal care follow-ups or admitted in the ward at LUH Jamshoro and Civil Hospital Hyderabad were included. Women were and assessed for maternal anxiety using the Hamilton Anxiety Rating Scale (HAM-A) and pregnancy outcomes. All the relevant data were entered and analyzed using SPSS version 26.
Results: Average age of the pregnant women was 27.83+5.43 years. Multiparous women were (131, 57.7%) and remaining 96 (42.3%) being Primiparous. Out of all, 76(33.5%) women had moderate anxiety and 29 (12.8%) were scored in the severe range with overall mean HAS been 23.04+ 8.6. Most common adverse outcomes were low birth weight (72, 31.7%) and intrauterine growth restriction (65, 28.6%), followed by pre-eclampsia (52, 22.9%), preterm birth (45, 19.8%), gestational diabetes (39, 17.2%) and gestational hypertension (30, 13.2%). Preterm birth, intrauterine growth restriction and low birth weight, were significantly linked to anxious women compared to those, who were without anxiety ($p = 0.001$). However the maternal complications were not significantly linked to PSA ($p > 0.05$).
Conclusion: PSA was observed frequently high with nearly half affected to a moderate or severe degree among women during their trimester of pregnancy and significantly associated to preterm labour, preterm birth, intrauterine growth restriction and low birth weight.
Keywords: Pregnancy, Maternal anxiety, birth weight, adverse outcomes, Hamilton anxiety scale.

Cite this article as: Durrani ZA, Shaikh K, Mahmood A, Ghaffar S, Muttia, Iqbal H. Effects of Pregnancy Specific Anxiety on Pregnancy Outcome. J Soc Obstet Gynaecol Pak. 2026;16(3):287-292. DOI. 0.71104/jsogp.v16i3.1105

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Introduction

The gestation is a period of extreme physiological and psychological transition, and the anxiety is among its most common emotional and psychological Problems. Every women woman responds differently to the physical and psychological changes and challenges of pregnancy, and the degree of stress experienced may significantly influence pregnancy outcomes.[1]

Researchers increasingly distinguish general anxiety from pregnancy-specific anxiety (PSA) a distinct, multidimensional psychological condition characterized by pregnancy-specific fears and concerns regarding fetal health and well-being, maternal health, childbirth, and pregnancy-associated changes in physical appearance and the image of body.[2,3] The reported prevalence of anxiety disorders during pregnancy varies considerably across populations and the assessment methods according to the studies, like international studies have reported prevalence rates of 45.83% in Senegal and 71% in a nationwide Saudi Arabian study, while a recent study from rural India documented pregnancy-related anxiety in 84% of cases.[5-6] According to the study from Bahrain, around 15% of pregnant women experienced higher level of anxiety and 38% reported moderate level anxiety.[7]

The raised maternal anxiety during the prenatal period has been associated with several adverse consequences, including a less positive perception of childbirth, a boosted likelihood of preterm delivery and

Authorship Contribution: [1,4]Substantial contributions to the conception or design of the work or the acquisition and wrote draft of manuscript, [2]Final approval of the study to be published, [3,4,5]Drafting the work or revising it critically for important intellectual content, [6]literature search and manuscript writing,

Funding Source: none
Conflict of Interest: none

Received: Feb 27, 2026 Revised: June 10, 2026
Accepted: July 12, 2026

the low birth weight.[8] Additionally, maternal anxiety during pregnancy has been associated to a higher risk of postpartum depression and potential adverse effects on the subsequent cognitive and emotional development of the fetus.[8] Although, the specific evidence evaluating pregnancy-associated fears and concerns using validated instruments remains limited at local level. According to a systematic review of 269 studies identified 39 separate instruments for measuring anxiety associated to pregnancy, endorsing both the rapid growth of this field and the absence of a standard measure; less than 20% of the included studies were conducted in low- and middle-income nations and only 13.8% validated their instrument for the target population.[9] The PSA comprises more than an emotional response to pregnancy; it may also be related to alterations in maternal neuroendocrine and physiology of placenta. The maternal psychological state is linked to obstetric and fetal outcomes through numerous interacting pathways. The persistent pregnancy-associated fears and psychological distress possibly influence the hypothalamic–pituitary–adrenal (HPA) axis that regulates the hormonal response to stress of the body. This pathway stimulates hypothalamic secretion of corticotropin-releasing hormone (CRH), consequently promoting pituitary adrenocorticotropic hormone (ACTH) release and production of the adrenal cortisol. Though cortisol plays an essential role physiologically in the maintaining maternal metabolic functions and supporting the maturation of fetus, prolonged psychological distress may be linked to the alterations in maternal cortisol concentrations and their normal circadian rhythm.[10,11]

The regulatory role of the placenta is also very important in determining fetal exposure to maternal glucocorticoids. At the normal physiological conditions, placental 11β-hydroxysteroid dehydrogenase type 2 (11β-HSD2) biologically converts to active cortisol into inactive cortisone, thereby providing partial protection against excessive exposure of fetus to the maternal cortisol. Although, the psychological distress of placenta may be related to altered placental 11β-HSD2 expression and regulation of the glucocorticoids.

According to a systematic review and meta-analysis of longitudinal studies demonstrated a modest negative correlation between psychological distress of placenta and placental 11β-HSD2 gene expression, also proposed that the psychological distress during the third trimester was more frequently linked to decreased placental 11β-HSD2 expression.[11]

Evidence from South Asia is limited but suggests the association may be at least as strong as in high-income regions. According to a local cohort, pregnancy-related anxiety predicted preterm birth more compared to general anxiety, depression or the persistent stress, and a planned pregnancy significantly lowered that risk.[12] Collectively findings suggested that PSA is a measurable and potentially modifiable risk factor rather than a normal accompaniment of pregnancy. Though, most evidence derives from developed countries and few studies have measured a range of obstetric and neonatal outcomes simultaneously.[2,12] Therefore this study was planned to assess the effect of pregnancy-specific anxiety on pregnancy outcomes.

Methodology

This was a cross-sectional, observational study conducted at the Department of Physiology, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, in collaboration with the Department of Gynaecology and Obstetrics, LUMHS, Jamshoro, and the Diagnostic and Research Laboratory, LUMHS, Jamshoro/Hyderabad. The study was conducted over a six-month period, from February 2022 to July 2022, following approval from the Ethical Review Committee (ERC) of LUMHS (No. LUMHS/REC/30).

The sample size of 227 participants was calculated using an empirical formula, based on an estimated prevalence of pregnancy-specific anxiety (PSA) of 18%, a 95% confidence level, and a 5% margin of error.

All pregnant women with singleton pregnancies in their third trimester who regularly attended outpatient department (OPD) visits or antenatal care follow-ups, or were admitted to the wards at Liaquat University Hospital, Jamshoro, and Civil Hospital, Hyderabad, were included in the study. Women with a history of multiple pregnancies (e.g., twins), pre-existing hypertension, or current antihypertensive treatment; those who did not attend regular antenatal care follow-ups; those receiving treatment with antidepressants or antipsychotics; and those diagnosed with endocrinological disorders were excluded.

Written informed consent was obtained from each participant. Before enrolment, the study procedures, potential risks, and benefits were explained in detail during individual counselling sessions. Women who declined participation or were unable to understand the study objectives were not enrolled. Participation was

voluntary and involved no financial implications for the participants.

Maternal anxiety was assessed using the Hamilton Anxiety Rating Scale (HAM-A), comprising 14 semi-structured items administered by a psychologist or trained physician. Seven items assessed psychological anxiety symptoms, while the remaining seven assessed somatic anxiety symptoms. Each item was scored on a five-point scale ranging from 0 to 4 (0 = not at all, 1 = mild, 2 = moderate, 3 = severe, and 4 = very severe). Based on the total score, anxiety was classified as none (<18), mild (18–25), moderate (26–30), or severe (>30).

Pregnancy outcomes, particularly low birth weight and pre-eclampsia, were assessed by following the enrolled participants until delivery. Relevant maternal and neonatal outcomes were recorded through reviews of medical records, antenatal follow-up visits, and delivery records. Maternal outcomes included gestational age at delivery, mode of delivery (vaginal or caesarean section), preterm delivery, pregnancy-induced hypertension, pre-eclampsia, gestational diabetes mellitus, and other documented pregnancy-related complications.

Pre-eclampsia was diagnosed according to the criteria of the American College of Obstetricians and Gynecologists (ACOG), defined as the development of hypertension (systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg) after 20 weeks of gestation in a previously normotensive woman, accompanied by proteinuria.

Neonatal outcomes included birth weight, Apgar scores at 1 and 5 minutes, admission to the neonatal intensive care unit (NICU), and stillbirth, where applicable. Preterm delivery was defined as delivery before the completion of 37 weeks of gestation, while low birth weight (LBW) was defined as a birth weight of less than 2,500 g. All relevant data were entered and analyzed using IBM SPSS Statistics version 26.

Results

The mean age of the participants was 27.83 ± 5.43 years, while the mean body mass index (BMI) was 27.56 ± 3.38 kg/m². Obesity was observed in 137 (60.4%) women. Most participants were multiparous (131, 57.7%), while 96 (42.3%) were primiparous. Regarding educational status, more than half of the participants had attained secondary (Matric) education or higher. Most women were employed (143, 63.0%), while 84 (37.0%) were housewives. The majority belonged to the middle- and lower-socioeconomic-status groups. Regarding neonatal measurements, the mean birth weight was 2.76 ± 0.74 kg, and the mean head circumference was 33.61 ± 1.05 cm, as presented in Table I.

Table I: Demographic and clinical characteristics of the patients. (n=227)

Study Variables		n(%)/mean ± SD	
Age		27.83±5.43 years	
BMI		27.56±3.38 kg/m²	
Parity	Primiparous	96	42.3
	Multiparous	131	57.7
Educational status	Illiterate	49	21.6
	Primary	50	22.0
	Metric	68	30.0
	Intermediate	37	16.3
	Graduate or higher	23	10.1
Employment status	Employed	143	63.0
	Housewife	84	37.0
Socioeconomic Status	Low	78	34.4
	Middle	87	38.3
	High	62	27.3
Obese	Yes	137	60.4
	No	90	39.6
Birth weight		2.76±0.74 kg	
Head circumferences		33.61±1.05 cm	

Of the 227 women, 178 (78.4%) had anxiety scores above the specified threshold, with 105 (46.3%) experiencing moderate-to-severe anxiety. Moderate anxiety was the most frequently observed category, affecting 76 (33.5%) women, followed by mild anxiety in 73 (32.2%). Severe anxiety was observed in 29 (12.8%) women, while 49 (21.6%) had no anxiety. The overall mean Hamilton Anxiety Rating Scale (HAM-A) score was 23.04 ± 8.60, as illustrated in Figure 1.

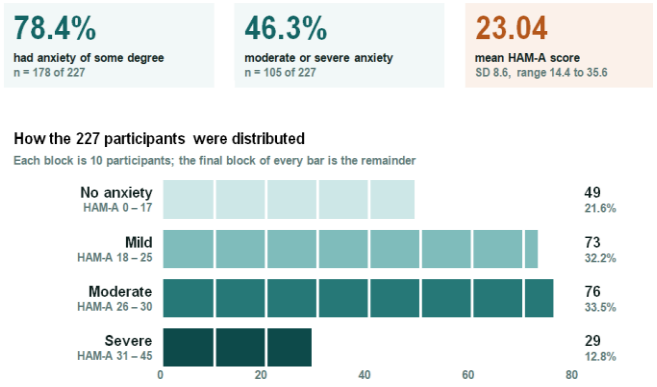


Figure 1. Frequency and severity of anxiety among patients. (n=227)

Table II: Association of pregnancy outcomes with pregnancy specific anxiety. (n=227)

Pregnancy outcomes		No anxiety	Anxiety	Total	p-value
Obesity	No	20 (8.8)	70 (30.8)	90 (39.6)	0.850
	Yes	29 (12.8)	108 (47.6)	137 (60.4)	
GDM	No	45 (19.8)	143 (63.0)	188 (82.8)	0.059
	Yes	4 (1.8)	35 (15.4)	39 (17.2)	
Pre-eclampsia	No	40 (17.6)	135 (59.5)	175 (77.1)	0.393
	Yes	9 (4.0)	43 (18.9)	52 (22.9)	
Preterm labour	No	47 (20.7)	146 (64.3)	193 (85.0)	0.016
	Yes	2 (0.9)	32 (14.1)	34 (15.0)	
Gestational hypertension	No	43 (18.9)	154 (67.8)	197 (86.8)	0.821
	Yes	6 (2.6)	24 (10.6)	30 (13.2)	
PPROM	No	49 (21.6)	172 (75.8)	221 (97.4)	0.193
	Yes	0 (0.0)	6 (2.6)	6 (2.6)	
Antepartum hemorrhage	No	46 (20.3)	174 (76.7)	220 (96.9)	0.165
	Yes	3 (1.3)	4 (1.8)	7 (3.1)	
Mode of delivery	Caesarean	16 (7.0)	64 (28.2)	80 (35.2)	0.668
	Vaginal	33 (14.5)	114 (50.2)	147 (64.8)	
Postpartum hemorrhage	No	46 (20.3)	159 (70.0)	205 (90.3)	0.340
	Yes	3 (1.3)	19 (8.4)	22 (9.7)	
Low birth weight	No	44 (19.4)	111 (48.9)	155 (68.3)	0.001
	Yes	5 (2.2)	67 (29.5)	72 (31.7)	
IUGR	No	41 (18.1)	121 (53.3)	162 (71.4)	0.031
	Yes	8 (3.5)	57 (25.1)	65 (28.6)	
Stillbirth	No	47 (20.7)	173 (76.2)	220 (96.9)	0.648
	Yes	2 (0.9)	5 (2.2)	7 (3.1)	

Regarding pregnancy outcomes, low birth weight (LBW) was observed in 72 (31.7%) newborns, while intrauterine growth restriction (IUGR) was reported in 65 (28.6%). Pre-eclampsia occurred in 52 (22.9%) women, preterm birth in 45 (19.8%), and gestational diabetes mellitus (GDM) in 39 (17.2%). Gestational hypertension was recorded in 30 (13.2%) women, while postpartum haemorrhage (PPH) occurred in 22 (9.7%). Caesarean section was performed in 35.2% of deliveries, while 64.8% were vaginal deliveries. Additionally, antepartum haemorrhage and stillbirth each occurred in 7 (3.1%) cases, while preterm premature rupture of membranes (PPROM) was reported in 6 (2.6%) cases.

Low birth weight was significantly more frequent among women with anxiety than among those without anxiety ($p = 0.001$). Similarly, preterm birth and IUGR were significantly more common among anxious women ($p < 0.05$). Gestational diabetes mellitus showed a comparable trend, with a higher frequency among anxious women (19.7% versus 8.2%); however, this association did not reach statistical significance ($p = 0.059$). No statistically significant associations were observed between anxiety and pre-eclampsia, gestational hypertension, mode of delivery, haemorrhagic complications, or stillbirth ($p > 0.05$), as presented in Table II.

Discussion

The gestational time is a critical period characterized by substantial physiological and psychological adaptations; during that maternal emotional well-being may significantly influence the course of pregnancy. PSA, beyond general psychological distress, has increasingly gained consideration as a potential determinant of adverse maternal and fetal outcomes, reflecting the importance of understanding its implications for the fetal and maternal health. This study was conducted to assess the effects of PSA on pregnancy outcome on 227 women during third month of pregnancy with an overall mean age of 27.83 ± 5.43 years and a mean body mass index of 27.56 ± 3.38 kg/m², relatively similar to the findings reported by Kornerup N et al[13] who reported mean age of 2961 pregnant women 30.1 years and mean BMI 29.3 kg/m².

Findings were also consistent with the study conducted by Ghezi S et al[14] who demonstrated mean age of women 28.97 ± 5.9 years, mean pre-pregnancy BMI 25.16 ± 4.4 kg/m² and mean gestational age around 22.84 ± 10.2 week. The mean age mid-to-late twenties across the studies may due to, this age range represents a period of relatively higher reproductive activity.

In this study PSA was present in 78.4% of the 227 women studied, with a mean Hamilton Anxiety score of 23.04 ± 8.6, corresponding to the results reported by

Choudhary N et al[15], who found Pregnancy-associated anxiety affected 84% of the 213 pregnant women, with most of the women had mild anxiety (60.1%); moderate and severe anxiety around 22.5% and 1.4% respectively. A similar pattern also reported by Gerges S et al[16] who found 70.3% pregnant women with a significant level of anxiety. Our findings were comparable to those documented by Gul F et al[17] who reported that around three-quarters of the women (359, 71.8%) were anxious and depressed according to the AKUADS, compared with 141 (28.2%) who were not anxious and depressed. However the findings are considerably higher than the 46.7% prevalence reported by Ahmed et al. among 390 antenatal attendees at a Karachi tertiary-care hospital,[18] and higher than the pooled South Asian estimates synthesized by Insan et al.[19] Most of the previous studies have reported a higher frequency of anxiety during pregnancy; however, variations in prevalence across studies is more likely to differences in selection criteria of the patients, significant difference in the sample of studies, differences in the timing of assessment and tools for the assessment of anxiety, as in this study, anxiety was assessed during the third trimester, relatively close to delivery, using the Hamilton Anxiety Rating Scale (HAM-A). Additionally, differences in sociodemographic characteristics and sample composition across study populations may also explain the comparatively lower prevalence observed in some studies.

In this study preterm labour occurred in 19.7% of anxious women compared with 4.1% of non-anxious women ($p = 0.009$), preterm birth in 24.2% versus 4.1% ($p = 0.002$), low birth weight in 48.3% versus 18.4% ($p = 0.001$) and intrauterine growth restriction in 32.0% versus 16.3% ($p = 0.031$), while obesity, pre-eclampsia, gestational hypertension, mode of delivery, antepartum and postpartum hemorrhage and stillbirth did not showed significant difference between the groups ($p>0.05$). This pattern reproduces almost exactly that of Grigoriadis et al., whose meta-analysis of 29 prospective studies found antenatal anxiety associated with preterm birth (OR 1.54, 95% CI 1.39–1.70), low birth weight (OR 1.80, 1.48–2.18), small-for-gestational-age birth (OR 1.48, 1.26–1.74) and reduction in mean birth-weight 55.96 g, while associations with pre-eclampsia, caesarean delivery and Apgar scores were statistically insignificant.[21]

Closely resembling to our findings, more recent cumulative meta-analysis by Duko et al[21] pooling 40 studies and over 1.97 million mother–child pairs, demonstrated an adjusted odds ratios of 1.41 (1.27–1.58) for preterm birth and 1.32 (1.16–1.51) for low birth weight, and concluded that these estimates are now statistically stable. Worrall et al[22] systematic review of 41 studies similarly found an inverse relationship between prenatal anxiety and gestational age. Overall observed associations are biologically plausible and may be described by stress-associated neuroendocrine mechanisms. The persistent maternal anxiety may activate the hypothalamic–pituitary–adrenal (HPA) axis, subsequent in increased maternal cortisol concentrations and potentially greater fetal exposure to glucocorticoids. Such alteration may interfere with placental function, fetal growth, and the timing of parturition, thereby contributing to preterm delivery, IUGR and LBW. Moreover, alterations in placental 11β-hydroxysteroid dehydrogenase type 2 (11β-HSD2), which normally regulates fetal exposure to maternal glucocorticoids, may provide an additional mechanism linking maternal psychological distress with adverse fetal outcomes. Nevertheless, these findings require cautious interpretation because anxiety was evaluated at a single time point, and the analysis did not include multivariable adjustment for potential confounders. Additionally, the fetal complications clinically interrelated outcomes and may partly reflect overlapping underlying mechanisms rather than independent effects. The depression, which frequently coexists with anxiety during gestation, was also not assessed and may have contributed to the observed relationships. Collectively, the findings demonstrated a relationship between PSA and adverse pregnancy outcomes; though, given certain significant limitations, further adequately powered studies with longitudinal anxiety assessment and adjustment for relevant maternal and obstetric confounders are warranted to establish the independent contribution of PSA.

Conclusion

Pregnancy-specific anxiety was observed frequently high with nearly half affected to a moderate or severe degree among women during their trimester of pregnancy. The anxious women had significantly higher rates of preterm labour, preterm birth, intrauterine growth restriction and low birth weight, while no significant differences noted with maternal adverse outcomes. The pattern around fetal growth and length of gestation is biologically coherent with a neuroendocrine pathway of sustained maternal cortisol exposure and impaired uteroplacental hemodynamics.

The entire woman should be screened at antenatal booking and again in the third trimester, as well as brief psychological counseling should be integrated into the routine antenatal visit, to improve the pregnancy outcomes.

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