

IMPACT OF SLEEP QUALITY ON ANXIETY LEVELS IN THIRD TRIMESTER PREGNANT WOMEN AT LIAQUAT UNIVERSITY HOSPITAL HYDERABAD

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ABSTRACT

Background: Sleep disturbance and anxiety symptoms are important concerns in late pregnancy. Local evidence can support antenatal assessment, provided that subjective sleep ratings and anxiety screening scores are distinguished from clinical diagnoses.

Objectives: To identify common sleep disturbances, determine the association between self-rated sleep quality and anxiety symptom severity, and assess anxiety symptom severity among third-trimester pregnant women at Liaquat University Hospital Hyderabad.

Methods: An analytical cross-sectional study recruited 248 women at 28–40 weeks of gestation through purposive sampling over six months. An adapted sleep questionnaire assessed disturbances and overall sleep quality using Question 8; no global Pittsburgh Sleep Quality Index score was calculated. Anxiety symptoms were measured using the Generalized Anxiety Disorder 7-item scale (GAD-7). SPSS version 20 was used for descriptive statistics, Spearman correlation and a supporting chi-square comparison. Sleep ratings and GAD-7 scores each had 247 valid records; paired analyses included 246 women.

Results: Thermal discomfort (61.3%), fetal movements (60.5%) and night waking (59.7%) were the most frequently reported disturbances occurring at least weekly. Poor self-rated sleep was reported by 127/247 women (51.4%). The mean GAD-7 score was 9.64 (SD 4.44); 34 women (13.8%) had minimal, 89 (36.0%) mild, 84 (34.0%) moderate and 40 (16.2%) severe symptoms. Poorer sleep ratings correlated with higher GAD-7 scores ($\rho = 0.395$, $p < 0.001$). Moderate/severe symptoms occurred in 64.3% of the poor-sleep group and 35.0% of the good-sleep group ($\chi^2 = 21.086$, $df = 1$, $p < 0.001$; unadjusted OR = 3.34, 95% CI 1.98–5.64).

Conclusion: Sleep disturbances and anxiety symptoms were common and associated in this hospital sample. Antenatal care should consider both concerns, with appropriate assessment and referral. The cross-sectional design, purposive sampling and subjective measurements limit causal interpretation and generalisability.

KEYWORDS: pregnancy; third trimester; sleep quality; anxiety; GAD-7; antenatal nursing.

1. INTRODUCTION

Pregnancy involves physical changes that support fetal development and prepare the mother for childbirth. As pregnancy advances, these changes can make restful sleep more difficult. During the third trimester, back pain, urinary frequency, heartburn and leg cramps may disturb sleep. The growing abdomen can restrict comfortable sleeping positions, while fetal movements may interrupt sleep during the night. These experiences make sleep an important part of antenatal assessment.¹

Reproductive hormones form part of the physiological context of pregnancy, but sleep disruption should not be attributed to hormonal change alone. Haufe and Leeners describe the importance of nocturnal urination, reflux and musculoskeletal discomfort during pregnancy, which may obscure the contribution of individual hormones.² This distinction matters when considering a woman's report of poor sleep: several physical and emotional experiences may be present at the same time, and a single complaint does not establish its cause.

Research in low- and middle-income countries indicates that poor sleep becomes more common as gestation advances. A recent systematic review comparing pregnancy trimesters found the greatest burden in the third trimester.³ The studies included in that review used the Pittsburgh Sleep Quality Index (PSQI). Their estimates therefore describe sleep quality as defined by that instrument and cannot be treated as equivalent to a woman's response to one overall sleep-quality question.

Anxiety is another important concern during pregnancy. A review of evidence from low- and middle-income countries identified a substantial burden of anxiety and related disorders during the perinatal period.⁴ The term perinatal includes pregnancy and the period after childbirth, so these findings should not be read as estimates for the third trimester alone. They nevertheless support attention to psychological wellbeing within maternal care.

They also show why descriptions of anxiety symptoms, screening results and clinical diagnoses need to remain distinct.

Sleep and anxiety may occur together through several interacting processes. Worry and heightened arousal can interfere with settling to sleep, while sleep loss may impair emotional regulation. Recent psychiatric literature describes reciprocal relationships between sleep disturbance and anxiety, although the evidence includes populations other than pregnant women.⁵ This provides a theoretical basis for examining the variables together without assuming that the direction of their relationship has already been established in a particular antenatal population.

The social circumstances of pregnancy also require attention. A systematic review covering Bangladesh, India and Pakistan identified a range of social determinants associated with antenatal depression and anxiety. It also described limited integration of mental healthcare into antenatal services and the importance of cultural and socioeconomic context.⁶ Evidence from such settings is relevant to understanding why findings from one population may not transfer directly to another. It should not, however, be used to assume that every woman experiences the same barriers or sources of distress.

Pakistani studies provide evidence for considering sleep and psychological symptoms together. Waqas and colleagues reported an association between poor sleep quality and prenatal stress among women recruited in Punjab.⁷ In Karachi, Tariq and colleagues examined sleep-pattern dysfunction alongside anxiety, stress and depression in an antenatal hospital sample.⁸ These studies establish that relevant evidence exists within Pakistan, including Sindh. The remaining need is for evidence that addresses the particular population, stage of pregnancy and measurements used at Liaquat University Hospital Hyderabad.

Liaquat University Hospital (LUH), Hyderabad, is the setting of the present study. The research focuses on women attending its antenatal services during the third trimester. It examines common sleep disturbances and the association between self-rated overall sleep quality and anxiety symptom severity. The intention is to provide evidence that can inform local assessment and further research, rather than to assume that the characteristics of women studied elsewhere describe this hospital's patients.

The World Health Organization recommends an approach to perinatal mental health that is integrated with maternal and child health services and adapted to local and cultural circumstances.⁹ Within that broader direction, locally gathered evidence can help services identify questions that warrant closer attention. The present study contributes by describing sleep-related experiences and anxiety symptoms in the same group of women. It does not evaluate an intervention or determine whether introducing a particular screening procedure improves outcomes.

1.1 Problem Statement

Sleep disturbance and anxiety are clinically relevant concerns in antenatal care, but the evidence must be interpreted in relation to how each was measured. Recent reviews document poor sleep across pregnancy and a substantial burden of perinatal anxiety.^{3,4} Studies from Punjab and Karachi further indicate that sleep difficulties and psychological symptoms may coexist in Pakistani antenatal populations.^{7,8} These findings do not establish the relationship between a single self-rated sleep-quality item and GAD-7 anxiety symptom severity among third-trimester women at LUH Hyderabad.

A local examination is needed to describe the sleep disturbances women report, the severity of their anxiety symptoms and whether poorer self-rated sleep accompanies greater symptom severity. The study addresses these linked questions within one hospital population. Its results may inform discussion of sleep and emotional wellbeing during antenatal care, while the cross-sectional design limits conclusions to association. It cannot establish that sleep disturbance causes anxiety or that improving sleep would reduce anxiety in this sample.

1.2 Objectives of the Study

1.2.1 General Objective

To determine the common sleep disturbances, the severity of anxiety symptoms, and the relationship between self-rated sleep quality and anxiety symptom severity among third-trimester pregnant women attending Liaquat University Hospital Hyderabad.

1.2.2 Specific Objectives

1. To identify common sleep disturbances experienced by third-trimester pregnant women attending Liaquat University Hospital Hyderabad.
2. To determine the relationship between self-rated sleep quality and anxiety symptom severity among third-trimester pregnant women.
3. To assess the severity of anxiety symptoms among third-trimester pregnant women.

1.3 Scope of the Study

The study was conducted over six months at Liaquat University Hospital Hyderabad, Sindh, Pakistan. It included women at 28 to 40 weeks of gestation receiving antenatal care at the hospital, with eligible participants recruited through purposive sampling. The focus was common sleep disturbances and the relationship between self-rated overall sleep quality, recorded using Question 8 of an adapted sleep questionnaire, and anxiety symptom severity measured with the GAD-7. No global PSQI score was calculated.

2. LITERATURE REVIEW

Sleep disturbance and anxiety are related concerns in antenatal care, but their relationship is not adequately described by a single prevalence figure. Research differs in the stage of pregnancy examined, the aspects of sleep recorded and the meaning assigned to anxiety. A woman reporting repeated awakenings is not necessarily experiencing an insomnia disorder, and an elevated anxiety screening score is not a clinical diagnosis. These distinctions shape the interpretation of evidence relevant to third-trimester women at Liaquat University Hospital Hyderabad.^{1,4}

This chapter reviews recent evidence on common sleep difficulties, anxiety symptom severity and the association between them. It begins with the clinical and measurement concepts needed to interpret the literature, considers patterns across pregnancy, and then examines findings from Sindh, other Pakistani settings and neighbouring countries alongside wider international research. Intervention studies are considered separately because evidence that two variables are associated does not establish that treating one will improve the other. The review is a narrative synthesis, rather than a systematic review with an independently registered protocol or a pooled analysis. The central question is how existing evidence informs the three objectives established in Chapter 1. Particular attention is given to whether studies assessed the third trimester separately and whether their instruments are comparable with the present study's Question 8 sleep-quality rating and GAD-7 anxiety measure. The chapter concludes by identifying the specific contribution and limits of a local, cross-sectional investigation.

2.1 Sleep and Anxiety as Related but Distinct Constructs

Sleep quality includes a person's overall experience of sleep as well as difficulties with sleep initiation, continuity and daytime functioning. Duration is one aspect of that experience, but it does not describe all of it. Reviews of pregnancy-related sleep problems discuss insomnia, restless legs syndrome and sleep-disordered breathing alongside the discomforts of pregnancy. These conditions require different forms of assessment; a general report of poor sleep does not identify which, if any, is present.¹

The systematic review by Witkowska-Zimny and colleagues also distinguishes changes in sleep before and after childbirth. Its synthesis of 29 articles addresses sleep, emotional disturbance, breastfeeding and interventions across the perinatal period. The inclusion of postpartum experiences broadens its clinical relevance but limits its use as a source of exclusively antenatal estimates. After birth, infant care and feeding introduce circumstances that are different from the physical and anticipatory demands of late pregnancy.⁹

2.2 Sleep Difficulties Across Pregnancy

2.2.1 Physical and Hormonal Context

The physical circumstances of pregnancy help explain why a sleep complaint deserves assessment even when anxiety is absent. Urinary frequency, reflux, musculoskeletal discomfort and difficulty finding a comfortable position can interrupt rest. Haufe and Leeners caution that these accompanying changes make it difficult to isolate the contribution of reproductive hormones. Hormonal explanations are therefore plausible components of a wider account, rather than sufficient explanations for an individual woman's disturbed sleep.²

2.2.2 Trimester Differences and Variation Between Settings

Mislu and colleagues pooled 38 studies from low- and middle-income countries and reported poor sleep quality in 37.46% of women in the first trimester, 47.62% in the second and 60.05% in the third. The third-trimester estimate had a 95% confidence interval of 51.32% to 68.78%. These results support a greater burden in later pregnancy, while the uncertainty around the pooled estimate discourages treating it as a universal rate. The review used PSQI-based classifications, which cannot be substituted for a single-item sleep rating.³

2.3 Anxiety Symptoms During Pregnancy

2.3.1 Prevalence and Gestational Timing

Roddy Mitchell and colleagues reviewed 203 studies involving 212,318 women in 33 low- and middle-income countries. Their pooled estimate for generalized anxiety disorder was 22.2%. The review covered pregnancy and the first year after childbirth and included different validated assessment approaches. Its size establishes the importance of perinatal anxiety, but neither its population nor its outcome corresponds exactly to third-trimester GAD-7 severity categories in one hospital.⁴

2.3.2 Pregnancy Concerns and Psychological Context

Fear of childbirth provides one explanation for why sleep and distress may be linked near delivery. Mei and colleagues examined childbirth fear, psychological distress, resilience and sleep in a Chinese antenatal sample. Their analysis identified statistical relationships among these variables and suggested indirect pathways through distress. Because the data were collected cross-sectionally, the mediation model describes a pattern compatible with the proposed explanation; it does not demonstrate that fear preceded distress or that distress subsequently disrupted sleep.¹⁰

2.4 Evidence from Sindh and Other Pakistani Settings

2.4.1 Sleep and Psychological Symptoms in Karachi

The study by Tariq and colleagues is directly relevant because it examined sleep and psychological symptoms together in Sindh. It included 300 pregnant women at Civil Hospital Karachi and reported sleep-pattern dysfunction in 49.3%. Women with disturbed sleep had higher odds of anxiety, with a reported odds ratio of 4.76 and a 95% confidence interval of 2.91 to 7.80. The cross-sectional design supports an association; the odds ratio should not be read as a prospective risk of developing anxiety.⁸

2.4.2 Evidence from Punjab and Its Relevance

Waqas and colleagues examined sleep quality and prenatal stress among pregnant women in Punjab. Their cross-sectional study found that poor sleep was associated with greater prenatal stress. This is relevant national evidence that sleep difficulties occur alongside psychological distress. The outcome was stress, however, and should not be renamed anxiety. It supports examining the broader sleep–distress relationship while leaving the specific association with GAD-7 symptoms for the present study to investigate.⁷

2.5 Evidence from Neighbouring and Other Asian Settings

2.5.1 South Asian Comparisons

Peiris and Sundarapperuma studied 245 antenatal women in southern Sri Lanka. Most women, 60.8%, had good sleep quality, although third-trimester participants had worse PSQI scores than those in earlier pregnancy. Anxiety and depression were associated with sleep quality in bivariate analyses, but gestational age was the only factor retained as associated in the multivariable model. This finding is useful because it qualifies the impression that an unadjusted sleep–anxiety association must remain equally strong after other variables are considered.¹¹

2.5.2 Iranian Evidence and Temporal Relationships

The Bandar Abbas investigation reported associations between poorer sleep, pregnancy-related anxiety and fear of childbirth after adjustment for selected factors. Its inclusion of obstetric complications provides a broader clinical picture than a sample excluding complicated pregnancies requiring hospitalisation. This makes it relevant to the conceptual relationship but less directly comparable in terms of clinical composition. The instruments also assessed pregnancy-specific concerns rather than the general symptoms recorded by GAD-7.¹²

2.6 Possible Mechanisms Linking Sleep and Anxiety

The conceptual framework described in Chapter 1 provides a conceptual basis for examining the variables together. Recent literature on sleep and psychiatric disorders discusses reciprocal pathways involving arousal, worry and emotional regulation. Anxiety may interfere with settling or returning to sleep, while disrupted sleep may reduce the capacity to manage distress. These mechanisms are plausible explanations for co-occurrence, but the wider psychiatric literature does not establish their operation in every pregnant population.⁵

2.6 Measurement and Interpretation of the Evidence

2.7.1 Subjective Sleep Measures

Measurement is a major reason for caution when comparing sleep studies. Brown and colleagues followed 74 women from the third trimester into the first postpartum year using both PSQI self-reports and wrist actigraphy. The methods produced different estimates of sleep duration, latency and efficiency. Neither should be assumed to reproduce the other exactly. The findings show why subjective sleep experience and movement-based measurement can provide different information about the same period.¹³

This distinction supports accurate naming of the LUH sleep outcome. Question 8 records a subjective overall judgement over the preceding month. It does not measure sleep architecture, calculate sleep efficiency or diagnose insomnia. The good and poor grouping used in the study is a grouping of that item's response categories. It should therefore be compared cautiously with PSQI global classifications, even where both are described informally as sleep quality.

2.7.2 Anxiety Screening and Local Applicability

Vogazianos and colleagues evaluated the GAD-7 among pregnant and postpartum women in Cyprus. Their work provides recent evidence concerning its psychometric performance in a perinatal population. It does not, by itself, validate the Sindhi or Urdu versions used at LUH or demonstrate measurement equivalence across countries. The relevance of the source is support for perinatal symptom measurement, with local validity remaining a separate question.¹⁰

2.7.3 Design and Statistical Comparability

Recent methodological guidance emphasises matching statistical interpretation to the observational design and the variables measured. Cross-sectional, case-control and cohort designs answer related but different questions, and inappropriate analysis can weaken otherwise useful data. This is relevant when comparing correlations, odds ratios and adjusted regression coefficients across the sleep literature: they are not alternative units for the same quantity.¹⁴

2.8 Interventions and Implications for Antenatal Care

Intervention research helps assess whether sleep is a potentially modifiable concern, but improvements in sleep and anxiety must be considered separately. Shang and colleagues' meta-analysis included nine randomised trials involving 978 pregnant women. Cognitive behavioural therapy for insomnia improved insomnia severity and sleep quality immediately after treatment and during short-term follow-up. Evidence of sustained benefit at longer follow-up was less clear. These findings support a treatment approach for insomnia; they do not show that every antenatal sleep complaint requires the same intervention.¹⁵

3 METHODOLOGY

3.1 Study Design

An analytical cross-sectional study was conducted to describe sleep disturbances, assess anxiety symptom severity and examine their relationship among third-trimester pregnant women. Sleep and anxiety information was obtained during the same study contact. The design therefore addressed the three objectives through descriptions

of the sample and tests of association, without introducing an intervention or following participants over time. The primary comparison concerned the ordered responses to Question 8 of the adapted sleep questionnaire and the total score derived from the seven GAD-7 items. A supporting categorical comparison used grouped responses from these same measures. Cross-sectional observations can identify whether variables occur together, but cannot establish their temporal sequence or demonstrate causation.

3.2 Study Setting

The study took place in the Department of Obstetrics and Gynecology at Liaquat University Hospital (LUH), Hyderabad, Sindh. Women receiving third-trimester antenatal care constituted the accessible clinical population. Recruitment through this tertiary hospital provided an institutional sample within the setting specified by the research objectives. The findings describe the participating women and should not be treated as population estimates for Hyderabad or Sindh. Recruitment source was not coded as outpatient or ward attendance. The ward contribution and the reasons for any inpatient admission therefore could not be established from the available records.

3.3 Inclusion Criteria

Women were eligible if they were aged 18–45 years, were in the third trimester at 28–40 completed weeks of gestation, and provided written informed consent. Age and gestational age were recorded in completed years and weeks. The synopsis specified confirmation of gestational age through medical records, but participant-level dating sources were not documented in the analytical dataset.

3.4 Exclusion Criteria

Women were excluded if they had a previously diagnosed psychiatric illness, a known sleep disorder diagnosed before pregnancy, or a complicated pregnancy requiring hospitalization. These exclusions limited the inclusion of specified pre-existing disorders and obstetric complications that could affect the measures. They did not establish that every reported sleep difficulty began during pregnancy, rule out undiagnosed conditions, or eliminate all potential confounding. Anxiety symptoms identified by the questionnaire were interpreted within this selected clinical sample. The available records do not identify which ward patients, if any, met these criteria; no inpatient eligibility category was reconstructed retrospectively.

3.5 Sample Size

The approved synopsis specified a minimum sample of 234 participants. This estimate was based on an anticipated prevalence of 19%, a 95% confidence level and a 5% margin of error. Using the conventional formula for estimating a single population proportion, the calculation based on these assumptions is:

$$n = Z^2 p(1 - p) / d^2$$

$$n = (1.96^2 \times 0.19 \times 0.81) / 0.05^2$$

$$n = 236.49$$

The calculated value gives a minimum requirement of 237 participants after rounding upward. Although the minimum recorded in the approved synopsis was 234, the planned recruitment target was 240 participants. A total of 248 women were ultimately enrolled, exceeding both the planned target and the recalculated minimum. The original figure of 234 has been retained in the thesis to reflect the approved synopsis, while the recalculation is presented to clarify the difference produced by the stated assumptions.

3.6 Sampling Technique

Purposive sampling was used. Women were selected on the basis of the study's eligibility criteria and their willingness to provide informed consent. This was a non-probability approach: participants were not selected randomly from a sampling frame, and an equal or known probability of selection was not established. The method focused recruitment on the defined third-trimester population, but did not ensure representativeness.

3.7 Research Instrument

The structured questionnaire combined background information, an adapted sleep section and the GAD-7. English, Sindhi and Urdu versions appear in the supplied synopsis. The consent text estimated 10–15 minutes for completion. Administration mode, language used by each participant, the method of language selection, literacy assistance and interviewer involvement were not documented in the available records. Consequently, neither exclusively self-administered nor uniformly interviewer-administered completion can be asserted. Appendix B reproduces the questionnaire associated with the recorded variables.

3.8 Validity of Instrument

The supplied synopsis contains the adapted sleep questionnaire and seven GAD-7 items in English, Sindhi and Urdu. The thesis records that the Sindhi and Urdu versions were prepared with Prof. Naeem Quresh, Associate Professor and Head of the Department of Urdu, Government College University, Hyderabad, and Prof. Ehsan Laghar, Head of the Department of Sindhi Studies, Govt. Boys Degree College, TandoJam.

3.9 Data Management and Coding

Responses were entered once into a spreadsheet using predefined numeric codes. Each record carried a participant identifier and a paper-form reference. Names, contact details and medical-record numbers were not entered in the analytical dataset. No independent double entry was performed. The available electronic files permit reproducibility checks, but comparison with the original completed paper forms was not possible. Agreement between the CSV and SPSS dataset does not establish source-to-entry accuracy.

3.10 Data Collection Procedure

Formal permission of the concerned authorities of LUMHS Hospital, Jamshoro/ Hyderabad was obtained and data collection was started. The researcher visited the gynecology department to access the impact of sleep quality on anxiety in third trimester women at Liaquat University Hospital Hyderabad.

3.11 Ethical Considerations

Ethical approval was taken from the Ethical Review Committee (ERC) of Liaquat University of Medical and Health Sciences, Jamshoro before the data was collected. In addition Written informed consent was an eligibility requirement. English, Sindhi and Urdu consent texts in the synopsis describe voluntary participation and confidentiality, but the supplied text does not explicitly state a right to withdraw. All participants gave written informed consent. No personal identifiers were recorded and data collected were for the purposes of research only.

4 Data Analysis

4.7 Descriptive Analysis

Age, gestational age and recorded pregnancy count were summarized using means and standard deviations, medians, interquartile ranges and observed ranges. Categorical variables were described with frequencies and percentages. Age was not divided into arbitrary categories. Background characteristics were described without testing their relationships with sleep or anxiety.

4.8 Association Analysis

The primary analysis addressing the second objective was a two-tailed Spearman rank correlation between the four-category Question 8 rating and the GAD-7 total. Spearman correlation preserved the ordered nature of the sleep response; Pearson product-moment correlation was not used. Complete values on both measures were available for 246 women. A positive coefficient indicated that poorer self-rated sleep tended to accompany higher anxiety symptom scores.

Table 4.1: Age, gestational age and recorded pregnancy count (N = 248)

Variable	Mean (SD)	Median (IQR)	Range	Valid n
Age (completed years)	32.58 (7.97)	34.00 (26.00 to 39.00)	18 to 45	248
Gestational age (completed weeks)	34.19 (3.70)	34.00 (31.00 to 37.00)	28 to 40	248
Recorded pregnancy count	3.13 (1.41)	3.00 (2.00 to 4.00)	1 to 5	248

Age, gestational age and recorded pregnancy count were available for all 248 women. Participants ranged from 18 to 45 years, with a mean age of 32.58 years and a standard deviation of 7.97. The median was 34.00 years, and the lower and upper quartiles were 26.00 and 39.00 years. The observed ages therefore extended across the eligibility range used for recruitment. Table 4.1 presents the summaries

Table 4.2: Background characteristics of participants (N = 248)

Characteristic	Category	Frequency (n)	Percentage (%)
Marital status	Single	14	5.6
	Married	225	90.7
	Divorced	4	1.6
	Widowed	5	2.0
Education level	No formal education	55	22.2
	Primary school	38	15.3
	High school	62	25.0
	College or university	42	16.9
	Postgraduate	51	20.6
Employment status	Employed full-time	53	21.4
	Employed part-time	67	27.0
	Unemployed	60	24.2

Characteristic	Category	Frequency (n)	Percentage (%)
	Homemaker	68	27.4
Recorded pregnancy count	1	43	17.3
	2	46	18.5
	3	51	20.6
	4	51	20.6
	5	57	23.0
Diagnosed health condition	No	248	100.0
	Yes	0	0.0

Table 4.2 describes marital status, education, employment, pregnancy count and reported diagnosed health conditions. These variables had complete data for all 248 participants. Married women formed the largest marital-status category, accounting for 225 participants (90.7%). The remaining categories comprised 14 single women (5.6%), four divorced women (1.6%) and five widowed women (2.0%). The displayed percentages are rounded to one decimal place.

Table 4.3: Self-rated sleep quality, sleep duration, medication use and sleep satisfaction

Item	Category	Frequency (n)	Valid percentage (%)
Overall sleep quality (Q8), valid n = 247	Very good	33	13.4
	Fairly good	87	35.2
	Fairly bad	86	34.8
	Very bad	41	16.6
	Missing	1	
Grouped sleep quality, valid n = 247	Good (Q8 = 0 or 1)	120	48.6
	Poor (Q8 = 2 or 3)	127	51.4
Usual sleep duration (Q9), n = 248	Less than 4 hours	67	27.0
	4 to 5 hours	60	24.2
	6 to 7 hours	63	25.4
	8 or more hours	58	23.4
Sleep medication (Q11), n = 248	No	197	79.4
	Occasionally	35	14.1
	Regularly	16	6.5
Sleep satisfaction (Q12), n = 248	Very satisfied	55	22.2
	Satisfied	71	28.6
	Dissatisfied	54	21.8
	Very dissatisfied	68	27.4

All 248 women responded to the sleep-duration, medication and satisfaction items. Usual nightly sleep duration was distributed across the four available bands: 67 women (27.0%) reported less than 4 hours, 60 (24.2%) reported 4–5 hours, 63 (25.4%) reported 6–7 hours, and 58 (23.4%) reported 8 or more hours. The shortest-duration band was the largest and the longest-duration band the smallest, although the frequencies were relatively close. These grouped responses were not converted into a continuous mean sleep duration. Most participants reported no sleep-medication use: 197 women (79.4%) selected this response. Occasional use was reported by 35 women (14.1%), and regular use by 16 (6.5%). The item recorded frequency of use rather than a medication name, dose or indication. It was summarized descriptively and was not tested as a predictor of sleep quality or anxiety.

Table 4.4: Frequency of sleep disturbances during the past month

Disturbance	Not during the past month n (%)	Less than once a week n (%)	Once or twice a week n (%)	Three or more times a week n (%)	Valid n
Could not get to sleep within 30 minutes	21 (8.5)	91 (36.8)	89 (36.0)	46 (18.6)	247
Woke up in the middle of the night	23 (9.3)	77 (31.0)	105 (42.3)	43 (17.3)	248
Had to get up to use the bathroom	28 (11.3)	80 (32.3)	104 (41.9)	36 (14.5)	248
Felt too hot or cold	25 (10.1)	71 (28.6)	105 (42.3)	47 (19.0)	248
Had bad dreams	23 (9.3)	85 (34.3)	90 (36.3)	50 (20.2)	248
Had pain	29 (11.7)	74 (29.8)	100 (40.3)	45 (18.1)	248
Felt baby movements keeping her awake	19 (7.7)	79 (31.9)	114 (46.0)	36 (14.5)	248

Table 4.4 shows the complete distribution for each item. For difficulty falling asleep within 30 minutes, 91 women (36.8%) selected less than once a week and 89 (36.0%) selected once or twice a week. A further 46 (18.6%) reported the difficulty three or more times a week, while 21 (8.5%) did not report it during the month. The distribution therefore included both infrequent and recurrent difficulty, with the two middle frequency categories accounting for the largest groups.

Waking in the middle of the night occurred once or twice a week for 105 women (42.3%) and three or more times a week for 43 (17.3%). Getting up to use the bathroom occurred once or twice a week for 104 women (41.9%) and three or more times a week for 36 (14.5%). For both items, once or twice weekly was the most common response. The less-frequent and absent categories remain visible in Table 4.4 rather than being omitted from the description.

Table 4.5: Sleep disturbances ranked by at-least-weekly occurrence

Rank	Disturbance	At least weekly n	Valid n	Percentage (%)
1	Felt too hot or cold	152	248	61.3
2	Felt baby movements keeping her awake	150	248	60.5
3	Woke up in the middle of the night	148	248	59.7
4	Had pain	145	248	58.5
5	Had to get up to use the bathroom	140	248	56.5
5	Had bad dreams	140	248	56.5
7	Could not get to sleep within 30 minutes	135	247	54.7

Table 4.5 ranks the resulting proportions. Feeling too hot or cold ranked first, affecting 152 of 248 women (61.3%) at least weekly. Fetal movements keeping the woman awake followed with 150 women (60.5%), and waking during the night with 148 (59.7%). Pain was reported at least weekly by 145 women (58.5%). Bathroom trips and

bad dreams were tied, each reported by 140 women (56.5%). Difficulty falling asleep within 30 minutes ranked lowest, with 135 of 247 valid respondents (54.7%).

Every disturbance was reported at least weekly by more than half of its valid respondents. The highest and lowest proportions differed by 6.6 percentage points, indicating a relatively narrow descriptive spread across the seven items. The ranking does not establish that one disturbance was statistically more frequent than another: no significance test comparing the items was performed. The percentages also should not be summed, because the same woman could report more than one disturbance.

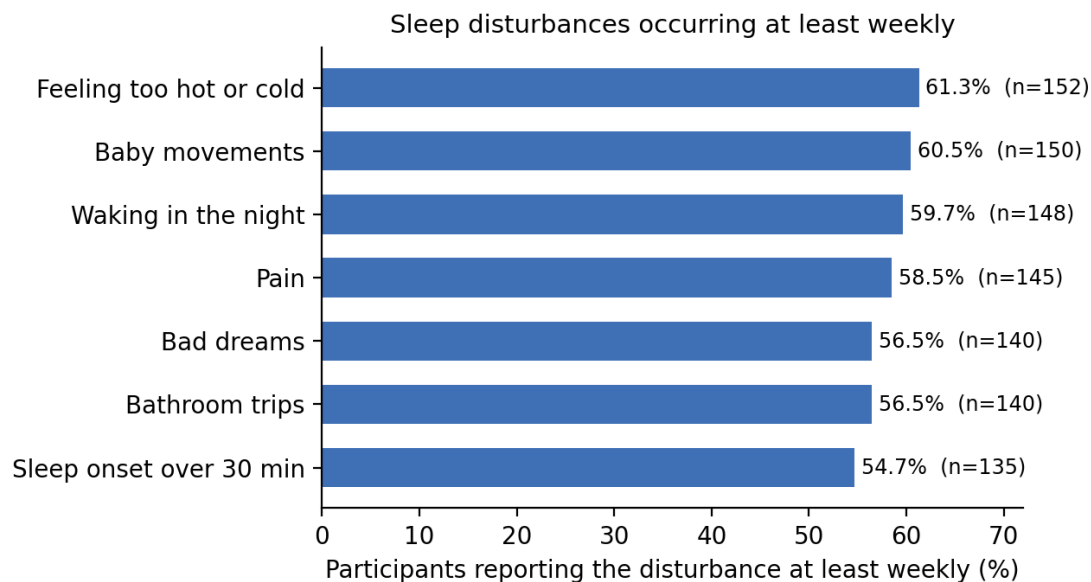


Figure 4.1: Sleep disturbances occurring at least weekly

Table 4.6: Spearman rank correlation between self-rated sleep quality and GAD-7 total

Variables	Spearman's rho	p-value (two-tailed)	Paired valid n
Self-rated sleep quality (Q8) and GAD-7 total	0.395	< 0.001	246

Spearman's rank correlation was 0.395, with a two-tailed p-value below 0.001. Table 4.6 and SPSS Output 4.8 present the coefficient and paired sample size. Higher Question 8 codes represented poorer sleep, while higher GAD-7 totals represented greater symptom severity. The positive coefficient therefore indicates that poorer sleep ratings tended to accompany higher anxiety scores in the analysed sample. The association was moderate in magnitude and statistically significant at the prespecified 0.05 level. It was not a perfect relationship: the result does not imply that every woman reporting poor sleep had a high anxiety score.

Table 4.7: Self-rated sleep quality by anxiety symptom severity (n = 246)

Self-rated sleep quality	Minimal or mild (0 to 9) n (row %)	Moderate to severe (10 to 21) n (row %)	Total
Good (Q8 = 0 or 1)	78 (65.0)	42 (35.0)	120 (100.0)
Poor (Q8 = 2 or 3)	45 (35.7)	81 (64.3)	126 (100.0)
Total	123 (50.0)	123 (50.0)	246 (100.0)

Table 4.7 gives the cell counts and row percentages. There were 120 women in the good-sleep group and 126 in the poor-sleep group. Among women reporting good self-rated sleep, 78 (65.0%) had minimal or mild anxiety symptoms and 42 (35.0%) had moderate to severe symptoms. Among women reporting poor sleep, 45 (35.7%) had minimal or mild symptoms and 81 (64.3%) had moderate to severe symptoms. Moderate to severe symptoms were thus more frequent within the poor-sleep group. The difference between the displayed row percentages was 29.3 percentage points. Figure 4.3 shows the same four cell counts and within-group percentages.

Table 4.8: Chi-square test and effect size for Table 4.7

Statistic	Value	Df	p-value
Pearson chi-square	21.086	1	< 0.001
Continuity correction	19.931	1	< 0.001
Likelihood ratio	21.399	1	< 0.001
Phi coefficient	0.293		< 0.001
Cramer's V	0.293		< 0.001
Odds ratio (poor vs good sleep)	3.343 (95% CI 1.981 to 5.640)		

Pearson's chi-square was 21.086 with one degree of freedom and $p < 0.001$. The minimum expected cell count was 60.00, and no expected cell count fell below five. Pearson's test therefore remained the reported supporting test; substitution with Fisher's exact test was unnecessary. The continuity-corrected statistic was 19.931 and the likelihood-ratio statistic was 21.399, both with one degree of freedom and $p < 0.001$. Table 4.8 and SPSS Output 4.9 retain these results.

Both phi and Cramer's V were 0.293, indicating an association of modest strength in the two-by-two comparison. The odds ratio was 3.343, with a 95% confidence interval from 1.981 to 5.640, reported in rounded narrative form as 3.34 (95% CI 1.98–5.64). Women reporting poor sleep had higher odds of moderate to severe anxiety symptoms than women reporting good sleep. This was an unadjusted odds comparison; it was not a risk ratio or evidence that poor sleep caused anxiety. SPSS Output 4.10 contains the symmetric measures and risk-estimate output.

Table 4.9: GAD-7 total score (valid n = 247)

Statistic	Value
Valid totals	247
Missing totals	1
Mean	9.64
Standard deviation	4.44
Median	10.00
Interquartile range	6.00 to 13.00
Observed minimum	0
Observed maximum	20

Table 4.9 presents the descriptive statistic. The missing total was retained as missing rather than estimated from the answered items. Observed totals ranged from 0 to 20, within the scale's possible range of 0–21. The mean was 9.64 and the standard deviation was 4.44. The median was 10.00, with lower and upper quartiles of 6.00 and 13.00. Thus, the middle portion of the score distribution extended across values in the mild and moderate severity bands. No participant's observed total reached the maximum possible score of 21.

Table 4.10: GAD-7 anxiety symptom severity (valid n = 247)

Severity band	GAD-7 total	Frequency (n)	Valid percentage (%)
Minimal	0 to 4	34	13.8
Mild	5 to 9	89	36.0
Moderate	10 to 14	84	34.0
Severe	15 to 21	40	16.2
Total valid		247	100.0
Missing		1	
Moderate to severe combined	10 to 21	124	50.2

Table 4.10 show all four categories, including the missing total separately. Figure 4.4 displays the category frequencies and valid percentages. Combining the upper two severity bands gave 124 women (50.2%) with

moderate to severe symptoms. The minimal-or-mild group contained 123 women (49.8%). The two combined groups were therefore nearly equal in size among all participants with valid totals. SPSS Output 4.13 provides this binary distribution. Its valid percentage of 50.2% for moderate to severe symptoms uses 247 as the denominator; the percentage based on all 248 records is displayed separately in the original output.

5 DISCUSSION

Sleep disturbances were common among women in the third trimester attending Liaquat University Hospital, Hyderabad, and poorer perceived sleep quality was associated with greater anxiety symptom severity. Among 247 women with a valid response to Question 8, 127 (51.4%) described their sleep as fairly bad or very bad. Among 247 women with complete GAD-7 scores, 124 (50.2%) had moderate or severe symptoms. The positive association between these measures was evident in both the ordinal and categorical analyses, although the cross-sectional design cannot establish which problem developed first.

5.7 Pattern of sleep disturbances

5.1.1 Frequency and nature of the reported problems

Feeling too hot or too cold was the most frequently reported weekly disturbance, affecting 152 of 248 women (61.3%). Fetal movements affected 150 (60.5%), night waking 148 (59.7%), pain 145 (58.5%), bathroom visits and disturbing dreams 140 each (56.5%), and difficulty initiating sleep 135 of 247 (54.7%). The difference between the highest and lowest percentages was only 6.6 percentage points. These findings describe several commonly experienced problems rather than one clearly dominant disturbance. No statistical comparison between the item frequencies was performed, so their ranking should not be interpreted as evidence that one problem was significantly more frequent than another.

5.1.2 Subjective sleep quality and gestational context

The four response categories provide more information than the good-versus-poor grouping alone. Sleep was rated very good by 33 women (13.4%), fairly good by 87 (35.2%), fairly bad by 86 (34.8%) and very bad by 41 (16.6%). Most responses were in the middle categories. The grouped result of 51.4% poor sleep should therefore be understood as a broad indicator of perceived difficulty, with variation in severity within that group. A woman reporting fairly bad sleep and a woman reporting very bad sleep may have different concerns, although both entered the same category for the contingency analysis.

The Karachi estimate of 49.3% is numerically close to the present finding, but proximity does not establish measurement equivalence.⁸ In Sri Lanka, Peiris and colleagues found that 60.8% of 245 participants had good sleep quality, with poorer sleep more evident later in pregnancy.¹⁸ In Bandar Abbas, Iran, a multicentre study reported poor PSQI-defined sleep in 70.8% overall and 79.1% in the third trimester.¹⁴ These results differ from Hyderabad in both magnitude and assessment. Their value is to place the findings within a range of antenatal experiences, rather than to classify this hospital as having a definitively higher or lower prevalence.

5.8 Association between sleep quality and anxiety

5.2.1 Interpretation of the study association

Among 246 women with paired responses, the correlation between poorer Question 8 ratings and higher GAD-7 scores was positive and statistically significant (Spearman's $\rho = 0.395$, $p < 0.001$). This indicates that women who rated their sleep less favourably generally reported more anxiety symptoms. The association was not perfect: a sleep rating could not identify an individual's anxiety severity with certainty. Spearman's correlation describes the ordering of the two measures and does not quantify the increase in GAD-7 points associated with a one-category deterioration in sleep.

The categorical analysis showed the same overall pattern. Moderate or severe symptoms occurred in 42 of 120 women with good sleep (35.0%) and 81 of 126 with poor sleep (64.3%), a difference of 29.3 percentage points. The association was significant (chi-square = 21.086, $df = 1$, $p < 0.001$), with phi/Cramer's $V = 0.293$. The unadjusted odds ratio was 3.34 (95% CI 1.98–5.64). This means that the odds of moderate-to-severe symptoms were higher in the poor-sleep group. It does not mean that their probability was 3.34 times higher, and it does not represent an independent effect after controlling for other influences.

5.2.2 Comparison with Local and Regional research

The closest geographical comparison is the Karachi study by Tariq and colleagues, which reported a positive association between sleep pattern dysfunction and anxiety, with an odds ratio of 4.76 (95% CI 2.91–7.80).⁸ The direction agrees with the Hyderabad result. The two odds ratios should not be ranked as if they estimated the same effect, because the sleep definitions, psychological measures and statistical models differ. The Punjab study also linked poor sleep with higher prenatal stress, reporting an odds ratio of 2.24.⁷ Stress is related to psychological distress but is a different outcome from the GAD-7 severity grouping.

5.2.3 International evidence and possible explanations

A study in Peru associated poor sleep with antenatal generalized anxiety symptoms after adjustment, with an adjusted odds ratio of 1.94; high risk of obstructive sleep apnoea was also associated with anxiety.¹⁶ An analysis of the ALSPAC cohort used repeated observations and marginal structural models to examine the relationship between sleep and anxiety over time. Such designs address some limitations of a single assessment, but their estimates still depend on measurement and modelling assumptions. They strengthen the rationale for longitudinal investigation without converting the present cross-sectional association into evidence of causation.

5.3 Distribution and interpretation of anxiety severity

5.3.1 Severity within the study sample

The mean GAD-7 score was 9.64 (SD 4.44), the median was 10 and the interquartile range was 6–13. Observed scores ranged from 0 to 20. Minimal symptoms were reported by 34 women (13.8%), mild symptoms by 89 (36.0%), moderate symptoms by 84 (34.0%) and severe symptoms by 40 (16.2%). The concentration around the threshold of 10 helps explain why approximately half the sample entered the moderate-to-severe category. The mean alone would conceal the substantial number with severe symptoms and the equally important group with minimal symptoms.

Local evidence suggests that the content of anxiety deserves attention alongside its numerical severity. A qualitative study of midwives at Koochi Goth Hospital, Karachi, identified gaps in knowledge and perceived competence concerning antenatal mental health.⁶² This finding concerns another institution and does not establish a training deficit among LUH staff. Nevertheless, it illustrates the practical importance of recognising psychological symptoms in antenatal care. The present severity distribution indicates a substantial assessment need within the participating sample, while providing no direct information about current referral capacity or the care women had already received.

5.3.2 Comparison across settings and instruments

South Asian comparisons demonstrate how the definition of anxiety changes the estimate. A cohort in rural central India reported psychiatric morbidity using a broader clinical assessment, rather than a GAD-7 severity threshold.¹⁷ A Dhaka study reported anxiety in 35.7% of 227 women using the State-Trait Anxiety Inventory.¹⁸ An Indian digital-screening feasibility study, which included pregnant and postpartum women, identified moderate-to-severe GAD-7 symptoms in 11.1%.¹⁹ The mixed perinatal composition and recruitment context make that figure unsuitable as a direct benchmark for this third-trimester hospital sample.

Internationally, Narayan and colleagues reported that 33% of 200 pregnant women at Chris Hani Baragwanath Academic Hospital in South Africa screened positive for anxiety on the GAD-7.²⁰ The difference from Hyderabad's 50.2% should be considered alongside eligibility, gestational composition and screening definitions. Validation studies of the GAD-7 in Spanish pregnant and postpartum participants and Polish postpartum women support its usefulness in those populations.^{21, 22} They do not establish the linguistic or diagnostic validity of the versions used in this study. The present alpha of 0.816 indicates internal consistency, rather than sensitivity, specificity or diagnostic accuracy.

5.4 Implications for antenatal nursing care

The findings support considering sleep and anxiety together during antenatal assessment. A poor sleep response can open discussion about discomfort, waking, sleep opportunity, worry and daytime effects. Further mental-health assessment may be appropriate when symptoms are persistent, severe or interfere with functioning. However, good perceived sleep cannot be used to rule out anxiety: 35.0% of women in the good-sleep group still had moderate-to-severe symptoms. An assessment approach based only on the poor-sleep category would therefore overlook a substantial group represented in these data.

5.5 Strengths and limitations

A strength of the study is its focused description of third-trimester sleep complaints and anxiety severity within a local antenatal setting. Reporting the individual sleep items, four sleep-quality categories and four GAD-7 categories preserves information that would be lost in a single grouped percentage. The ordinal and categorical analyses point in the same direction, increasing confidence that the observed association is not limited to one presentation of the measures. These analyses use overlapping data, however, and should not be treated as independent confirmation.

The principal limitation is the cross-sectional design. Sleep quality and anxiety were assessed within the same study period, leaving temporal order unresolved. Shared influences, including pain, socioeconomic strain, social support, prior mental-health difficulties or obstetric concerns, could contribute to both. No multivariable model was fitted, so the odds ratio remains unadjusted. Statistical significance does not remove this uncertainty, and the association should not be described as evidence that poor sleep independently caused anxiety or that treating sleep would necessarily reduce GAD-7 severity.

6. CONCLUSION

Sleep disturbances and anxiety symptoms were common and associated in this hospital sample. Antenatal care should consider both concerns, with appropriate assessment and referral. The cross-sectional design, purposive sampling and subjective measurements limit causal interpretation and generalizability.

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