

Comparison of Frequency of Antenatal Depression in Mothers of Infants Having Colic vs Normal Infants - A Case Control Study

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ABSTRACT

Objectives: To find association of antenatal depression in mothers with infantile colic.

Study Design: A case-control study

Pace and Duration of study: Department of Pediatric Medicine, Combined Military Hospital, Gujranwala for three months, from 02 December, 2025 to 01 March, 2026.

Methodology: After ethical approval, 100 infants and their mothers attending the outpatient pediatric ward at Combined Military Hospital, Gujranwala, were enrolled with informed consent. Infants were classified as colic or normal using Wessel's criteria. Mothers completed PHQ-9 under supervision. Groups were compared for antenatal depression, with data analyzed using SPSS v26.

Results: The study involved 100 mother–infant pairs. Infants had a mean age of 6.84 ± 2.51 months; 55% were 3–7 months and 45% were 8–11 months. Mean infant BMI was 23.18 ± 2.63 kg/m², with 66% normal weight. Maternal mean age was 28.87 ± 4.97 years and BMI 25.65 ± 3.62 kg/m². Case and control groups were comparable demographically. Mothers of infants with colic had significantly higher PHQ-9 scores and antenatal depression prevalence (82% vs 26%; OR = 12.97; $p < 0.001$). Stratified analysis confirmed significantly higher depression in cases.

Conclusion: In this study, mothers of infants with colic had significantly higher rates of antenatal depression and elevated PHQ-9 scores compared to mothers of normal infants. These findings highlight the importance of early screening, monitoring, and support for maternal mental health to potentially reduce the burden of infantile colic.

Keywords: Infant, Infantile Colic, Maternal Depression, Antenatal Care, PHQ-9, Risk Factors, Maternal Health.

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1. INTRODUCTION

Infantile colic (IC) is defined by Wessel's "rule of 3s" as crying or fussing of otherwise healthy infants for more than three hours per day, on more than three days per week, for at least three weeks.¹ Another commonly used definition is the Rome IV criteria. IC affects 2% to 73% of newborns worldwide² and generally resolves within the first six months of life.³ However, persistent symptoms can contribute to parental anxiety and repeated consultations. The etiology of IC remains unclear, with proposed causes ranging from gastrointestinal, neurological, to psychosocial factors.⁴ It is often considered a severe form of normal infant distress rather than a disease entity.^{3,4}

Antenatal depression (depression during pregnancy) is a serious mental health issue of global concern with a prevalence of 6.5 to 26.7% among pregnant women across the globe, leading to self-harm, impaired fetal development, preterm birth, low birthweight, poor maternal-infant attachment, and other negative effects on the development of children.⁵⁻⁷ Exposure of the fetus to maternal stress hormones can also result in the fetus being more susceptible to anxiety and stress.^{8,9} Children

born to depressed mothers also have problems with sleep and challenging temperaments which further worsen maternal depressive symptoms.^{10,11}

There is a limited and even conflicting evidence of the connection between antenatal depression and infantile colic. According to Gungor et al.¹² the rates of antenatal depression among the mothers of colicky infants were significantly higher than the ones of mothers of normal infants (87 vs. 18; $p < 0.001$) and the PHQ-9 scores were also found to be higher (16.47 ± 6.95 vs. 6.28 ± 4.91 ; $p < 0.001$). On the other hand, results of the studies by Ölmestig et al.¹³ showed that there was no significant difference in antenatal depression in the first ($p = 0.065$) and the second trimester ($p = 0.330$), whereas the third trimester showed significant higher rates ($p = 0.002$). These results demonstrate the inconsistency in timing and measurement as there is a necessity to conduct additional studies.

Due to a dearth of and debatable evidence,^{12,13} and lack of local research on the topic in Pakistan, the gap in the knowledge concerning the prevalence of antenatal depression among mothers of colic babies versus normal babies exists clearly. It is vital to undertake this study within the local region to comprehend this relationship, informal prevention, and anticipatory management of pregnant women who may get depressed. The findings can be used to inform the development of guidelines and evidence-based interventions that would enhance maternal and infant outcomes in resource-limited environments.

2. METHODOLOGY

The research was a case-control study which was carried out in the Department of Pediatric Medicine, Combined Military Hospital, Gujranwala. The research was conducted over three months, from 02 December, 2025 to 01 March, 2026, after the approval of the synopsis. A total of 100 infants were used in the study of which 50 of them were cases of infantile colic and 50 controls, normal infants. The sample was determined to provide 80% power and 5% level of significance with the assumption that the frequency of depression would be 87% among the mothers of colic infants and 18 percent in mothers of normal infants.¹²

Depression was defined as the presence of depressive symptoms, which were assessed using the PHQ-9 questionnaire. Scores were categorized as follows: No Depression (0–4), Mild Depression (5–9), Moderate Depression (10–14), Moderately Severe Depression (15–19), and Severe Depression (20–27). Infantile colic was defined according to Wessel's criteria, requiring that all of the following conditions were met: crying for more than three hours per day, on more than three days per week, and persisting for more than three weeks. The study hypothesized that there was a significant association between antenatal depression in mothers and infantile colic in infants.

The sampling method used was non-probability consecutive. The criteria of inclusion were infants of both sexes with the age range of 3 months to 11 months, the cases being infants with colic and the controls being normal infants. The mothers with prior psychological illnesses, those using medication due to chronic diseases like diabetes or hypertension and high-risk pregnancies were excluded to minimize confounding factors and create comparability between the groups.

One hundred infant-mother pairs that attended the outpatient ward to have routine checkups were sampled after receiving written informed consent of the mothers and following approval of the Hospital Ethical Review Board. The emographics of the infants were noted and the definition of colic based on the criteria of Wessel was made. Infants were further divided into cases (colic) and controls (normal infants). PHQ-9 questionnaire was administered to all mothers under the guidance of a senior doctor, who only helped them in comprehending questions, but did not affect the answers. The operational definition was that mothers were depressed or non-depressed. The study did not intervene in any of the patients by offering them any standard care provided in the department. To eliminate bias, the resident recorded the data and verified it with a senior consultant.

The SPSS version 26 was used to enter and analyze the data. Numerical variables such as infant age, infant BMI, maternal age, maternal BMI, PHQ-9 scores were presented in the form of mean SD. The categorical variables that were calculated as frequency and percentage included sex of the infants, case/control and antenatal depression. The Chi-square test was used to determine the relationship between antenatal depression and infantile colic, odds ratios were computed to estimate the strength of relationships between the two and confidence intervals of odds ratios were provided. The p-value of less than 0.05 was taken as statistically significant. To adjust the possible effect modifiers, the correlation between antenatal depression and infantile colic would be stratified in infant age, maternal age, infant gender, infant BMI and maternal BMI. Once stratified, Chi-square test was used to test significance ensuring that the confounding effect of these variables against the hypothesized hypothesis was limited.

3. RESULTS

The study included a total of 100 mother-infant pairs. The mean age of the infants was 6.84 ± 2.51 months, with 55% aged between 3–7 months and 45% aged 8–11 months. The average infant BMI was 23.18 ± 2.63 kg/m², with 66% classified as normal weight and 34% as overweight or obese. Regarding gender distribution, 54% of the infants were male and 46% were female. The mean maternal age was 28.87 ± 4.97 years, with the majority (61%) aged up to 30 years and 39% older than 30 years. Mothers had a mean BMI of 25.65 ± 3.62 kg/m², with 40% in the normal weight range and 60% overweight or obese. Data is given in Table I. The demographic characteristics of infants and their mothers were compared between the case (n = 50) and control (n = 50) groups. Infant age, body weight, and gender distribution were similar across both groups. Maternal age and body mass index also showed comparable patterns, indicating that the two groups were generally well-matched in terms of key characteristics as shown in Table II.

Mothers of infants with colic had a significantly higher mean PHQ-9 score (13.30 ± 6.22) compared to controls (6.28 ± 5.97 ; $p < 0.001$). Antenatal depression was more prevalent in the case group (82%) than in controls (26%), with an odds ratio of 12.97 (95% CI: 4.97–33.83). Moderate to severe depression was notably higher among cases, while no depression was more common in controls, indicating a significant difference between the groups ($p < 0.001$). Chi-square and independent t-tests were applied, with $p \leq 0.05$ considered significant as given in Table III. Upon stratification for all baseline variables, the odds of depression remained remarkably high ($OR > 1$) and its frequency was significantly higher in the case group ($p < 0.05$).

Table I: Demographic Characteristics of Infants & Mothers

Characteristics	Total (n=100)
Infant Age (months)	6.84±2.51
• 3-7 months	55 (55.0%)
• 8-11 months	45 (45.0%)
Infant BMI (kg/m²)	23.18±2.63
• Normal Weight	66 (66.0%)
• Overweight / Obese	34 (34.0%)
Infant Gender	
• Male	54 (54.0%)
• Female	46 (46.0%)
Maternal Age (years)	28.87±4.97
• Upto 30 years	61 (61.0%)
• > 30 years	39 (39.0%)
Maternal BMI (kg/m²)	25.65±3.62
• Normal Weight	40 (40.0%)
• Overweight / Obese	60 (60.0%)

Table II: Comparison of Demographic Characteristics of Infants & Mothers between the Groups

Characteristics	Cases (n=50)	Controls (n=50)	p-value
Infant Age (months)	6.88±2.78	7.00±2.22	.526
• 3-7 months	26 (52.0%)	29 (58.0%)	0.546
• 8-11 months	24 (48.0%)	21 (42.0%)	
Infant BMI (kg/m²)	23.11±2.56	23.24±2.72	0.800
• Normal Weight	35 (70.0%)	31 (62.0%)	0.398
• Overweight / Obese	15 (30.0%)	19 (38.0%)	
Infant Gender			
• Male	28 (56.0%)	26 (52.0%)	0.688
• Female	22 (44.0%)	24 (48.0%)	
Maternal Age (years)	28.56±4.67	29.18±5.29	0.535
• Upto 30 years	33 (66.0%)	28 (56.0%)	0.305
• > 30 years	17 (34.0%)	22 (44.0%)	
Maternal BMI (kg/m²)	26.09±3.55	25.21±3.67	0.223
• Normal Weight	17 (34.0%)	23 (46.0%)	0.221

• Overweight / Obese	33 (66.0%)	27 (54.0%)	
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Independent sample t test/ Chi Square test, taking p-value ≤ 0.05 as significant

Table III: Comparison of Mean PHQ9 Score and Frequency of Depression Among Mothers

Characteristics	Cases (n=50)	Controls (n=50)	p-value
Mean PHQ9 Score	13.30±6.22	6.28±5.97	0.000
Antenatal Depression			
• Yes	41 (82.0%)	13 (26.0%)	0.000
• No	9 (18.0%)	37 (74.0%)	
Odds Ratio (95% CI):	12.97 (4.97–33.83)		
Severity of Depression			
• No Depression	9 (18.0%)	37 (74.0%)	0.000
• Mild Depression	4 (8.0%)	2 (4.0%)	
• Moderate Depression	15 (30.0%)	4 (8.0%)	
• Moderately Severe	13 (26.0%)	3 (6.0%)	
• Severe Depression	9 (18.0%)	4 (8.0%)	

Chi Square test/ Independent sample t test, taking p-value ≤ 0.05 as significant.

4. DISCUSSION

Infantile colic is a common condition that often causes significant distress for both infants and their caregivers, and it has been associated with maternal psychological challenges, including antenatal depression.¹⁴⁻¹⁶ Despite its prevalence, there is a scarcity of local data examining the relationship between infant colic and maternal mental health, particularly antenatal depression. Most existing studies are limited to international populations, making it difficult to generalize findings to our community.¹²⁻¹⁴ Recognizing this gap, the present case-control study was planned to compare the frequency of antenatal depression in mothers of infants with colic versus mothers of normal infants, aiming to inform early screening and intervention strategies.

The mean age of the mothers in this study was 28.874±4.97, 61% were below the age of 30 years and 39% were above the age of 30 years. The average maternal BMI was 25.65 + 3.62 kg/ m² and 40 percent of the mothers were in normal range and 60 percent were overweight and obese. The mean age of the infants was 6.84±2.51 months, their mean BMI was 23.18±2.63 kg/m², and equal gender ratio was achieved by having 54 males and 46 females. All of these demographic features were similar in case and control groups, which means that the differences between the baseline would not likely confound the results of the study.

These characteristics compare to be similar and different when compared to the past researches. Maternal ages are a little older in Gungor et al. study (mean maternal age of 30.32 years), and Ozturkeli et al. (29.5 years) also reported nearly the same result as the present study (60% of mothers were overweight or obese). The age distributions of infants were comparable across the studies and it represented the normal age range at which infants experience the highest prevalence of colic. On the whole, the demographic characteristics reveal a minor difference between the studies, and the populations are quite similar, which supports the validity of cross-study comparisons on the topic of maternal depression and infantile colic.¹⁷

In the case of antenatal depression, the mean of PHQ-9 in mothers of infants with colic (13.30 ± 6.22) was significantly higher than in the controls (6.28 ± 5.97; $p < 0.001$). Depression was found more often in the case group (82% as compared to 26% in the controls) and the odds ratios included 12.97 95% CI: 4.97–33.83. Mothers of colicky babies were found to have moderate to severe depression significantly. This is in line with Güngör et al. who provide evidence on PHQ-9 scores of 16.47 + 6.95 in the colic group and 6.28 + 4.92 in the controls, showing the same scale of difference.¹² Oztepel et al. also provided the evidence of higher scores in Beck Depression Inventory among those who had colicky infants (18.3 vs 14.6 in controls), but higher scores were even in those mothers who had pregnancy complications.¹⁷

Further support comes from Ölmestig et al., who reported strong associations between antenatal depressive and anxiety symptoms and infant crying problems, highlighting the importance of maternal mental health during pregnancy in relation to infant outcomes.¹³ Similarly, Jalali et al. found that maternal migraines increased the likelihood of infantile colic, suggesting that maternal health factors, both psychological and physiological, may contribute to infant colic risk.¹⁸

Additional evidence is provided by the findings of Ölmestig et al., who have revealed the presence of strong associations between the symptoms of antenatal depression and anxiety and infant crying problems, indicating the significance of maternal mental health conditions, including psychological and physiological ones, in the development of infantile colic.¹³ Likewise, Jalali and colleagues have found that maternal migraines are more likely to cause infantile colic, meaning that the maternal conditions that affect mentally and physically may be the factors contributing to infantile colic.¹⁸ Taken together, these comparisons indicate that demographic characteristics across studies are broadly similar, and the observed differences in maternal depression are unlikely to be explained by age, BMI, or infant characteristics. Future research should explore larger, multicenter cohorts, investigate biological mechanisms, and evaluate interventions to reduce maternal depression and infant colic.

5. CONCLUSION

In this study, mothers of infants with colic had significantly higher rates of antenatal depression and elevated PHQ-9 scores compared to mothers of normal infants. These findings highlight the importance of early screening, monitoring, and support for maternal mental health to potentially reduce the burden of infantile colic.

DECLARATIONS

Ethical Approval

Ethical approval was obtained from Ethical Committee, Combined Military Hospital, Gujranwala vide letter No. ERB No. 18 of 2025 dated 01-12-2025.

Patients' Consent: Informed consent was obtained from all participants.

Competing Interest: The authors declared no conflict of interest.

Authors' Contribution:

Yousaf M: Substantial contributions to synopsis, study design, acquisition of data Analysis & Interpretation of Data, Manuscript writing. Has given final approval of the version to be published, agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Farid MN, Nawaz S: Substantial contributions to concept, study design, Data Analysis, Manuscript writing, Critical Review. Has given final approval of the version to be published, agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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