



ASSOCIATION OF ANAEMIA AND OTHER SOCIODEMOGRAPHIC AND HAEMATOLOGICAL FACTORS WITH ANTENATAL DEPRESSION AND ANXIETY AMONG PREGNANT WOMEN IN KHARIAN, PAKISTAN

Aiman Farogh Anjum^{1*}, Aftab Ahmed Khand²

^{1*}PhD Scholar, Department of Physiology, University of Sindh, Jamshoro, Pakistan.

²Associate Professor, Department of Physiology, University of Sindh, Jamshoro, Pakistan

Abstract

Background and Objective: Anaemia and antenatal mood disorders are both highly prevalent among pregnant women in low- and middle-income countries, but whether they are related is uncertain. This study determined the prevalence of antenatal depression and anxiety and examined their association with anaemia and other sociodemographic and haematological factors..

Methodology: A cross-sectional study was conducted on 397 pregnant women attending primary, secondary, and tertiary care facilities in Kharian, Punjab, Pakistan. Depression and anxiety were assessed with the Hospital Anxiety and Depression Scale (HADS; subscale score ≥ 11 = case). A complete blood count was performed and anaemia was defined as haemoglobin < 11 g/dL. Associations were tested with the chi-square test and independent-samples t-test in SPSS, with $p < 0.05$ considered significant.

Results: Anaemia was present in 51.1% of women (mean haemoglobin 10.92 ± 1.28 g/dL). Antenatal depression occurred in 20.4% and anxiety in 22.7%. Anaemia was significantly associated with antenatal depression (anaemic 24.6% vs non-anaemic 16.0%; $\chi^2 = 4.57$, $p = 0.033$) but not with anxiety (21.7% vs 23.7%; $p = 0.628$). Mean haemoglobin was lower in depressed women (10.80 vs 10.96 g/dL) though not significantly. None of the sociodemographic variables (age, education, residence, parity, gravidity, trimester, body-mass index) or other haematological indices was significantly associated with either outcome.

Conclusion: Anaemia affected half of the pregnant women studied and was significantly associated with antenatal depression, though not anxiety. Routine screening and treatment of anaemia in pregnancy may carry mental-health benefits in addition to its established physical benefits.

Key Words: Anaemia; Antenatal depression; Antenatal anxiety; Haemoglobin; Pregnancy; Pakistan.

Introduction

Antenatal depression and anxiety are among the most common complications of pregnancy and are substantially more prevalent in South Asia than in high-income regions [1,2]. In Pakistan, more than a quarter of pregnant women report clinically relevant depressive symptoms, with psychosocial adversity featuring prominently among the predictors [3]. These conditions matter beyond maternal wellbeing, as prenatal depression and anxiety are associated with poorer infant neurodevelopment independent of postpartum mood [4].

Anaemia is the other great burden of pregnancy in this setting. A recent systematic review and meta-analysis estimated the pooled prevalence of anaemia among pregnant women in Pakistan at approximately 70%, one of the highest figures reported worldwide [5]. Beyond its well-recognised obstetric consequences, iron deficiency the commonest cause of anaemia is biologically plausible as a contributor to low mood, because iron is a cofactor in monoamine neurotransmitter synthesis and its deficiency produces fatigue, reduced concentration, and impaired oxygen delivery.

A growing body of evidence links anaemia and iron deficiency in pregnancy with depressive symptoms. A case-control study in tertiary care hospitals in Lahore found that gestational iron-deficiency anaemia was associated with antenatal depression [6], and maternal anaemia in the first trimester has been related to poorer psychological health [7]. The evidence is not uniform, however; a prospective birth-cohort study found no association between gestational anaemia and antenatal or postpartum depression [8]. Whether anaemia is associated with antenatal mood in pregnant women in Kharian, Pakistan, and how it compares with sociodemographic and other haematological correlates, has not been examined.

The present study therefore determined the prevalence of antenatal depression and anxiety and examined their association with anaemia and other sociodemographic and haematological factors among pregnant women in Kharian, Pakistan.

Methodology

A cross-sectional study was conducted on 397 pregnant women attending primary, secondary, and tertiary level health-care facilities in the city of Kharian, district Gujrat, Punjab, Pakistan. The required sample size, estimated using the RAOSOFT online calculator, was approximately 400. A convenient sampling technique was used. Pregnant women of any gestational age who consented were included, and those with a previously diagnosed psychiatric illness on treatment, or who declined, were excluded. The study was approved by the institutional ethical review committee, and written informed consent was obtained from every participant.

Depression and anxiety were assessed with the Hospital Anxiety and Depression Scale (HADS), which yields separate seven-item anxiety and depression subscales scored 0–21; a subscale score ≥ 11 was taken to indicate a probable case. The HADS has demonstrated acceptable validity in pregnant populations [9,10]. Sociodemographic and obstetric data (age, education, area of residence, gravidity, parity, trimester, body-mass index) were recorded on a structured proforma. A complete blood count was performed on a venous sample, including haemoglobin, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), packed cell volume (PCV), red blood cell count (RBC), total leucocyte count (TLC), and platelet count. Anaemia was defined as haemoglobin < 11 g/dL and graded as mild (9–10.9 g/dL), moderate (7–8.9 g/dL), or severe (< 7 g/dL).

Data were analysed using SPSS. Frequencies and percentages were calculated for categorical variables and means with standard deviations for continuous variables. The association of caseness with categorical variables (including anaemia, both graded and dichotomised as anaemic vs non-anaemic) was tested with the chi-square test, and continuous haematological indices were compared between cases and non-cases using the independent-samples t-test. A p-value < 0.05 was considered statistically significant.

Results

The mean age of the 397 participants was 28.3 ± 4.8 years; most were multigravida (82.6%) and in the third trimester (57.9%), and 59.4% lived in rural areas. Anaemia (haemoglobin <11 g/dL) was present in 51.1% of women, mild in 45.8%, moderate in 4.8%, and severe in 0.5% — with a mean haemoglobin of 10.92 ± 1.28 g/dL. Sample characteristics are summarised in Table I.

Antenatal depression (HADS ≥ 11) was identified in 20.4% (81/397) of women and antenatal anxiety in 22.7% (90/397).

Anaemia was significantly associated with antenatal depression: depression occurred in 24.6% of anaemic women compared with 16.0% of non-anaemic women ($\chi^2 = 4.57$, $df = 1$, $p = 0.033$) (Table II). When anaemia was analysed in its four graded categories the association did not reach significance ($\chi^2 = 6.39$, $df = 3$, $p = 0.094$), reflecting the small numbers in the moderate and severe groups; the excess of depression was concentrated in mild anaemia (25.8%). Mean haemoglobin was lower in depressed women than in non-depressed women (10.80 ± 1.29 vs 10.96 ± 1.28 g/dL), but this difference was not statistically significant ($t = -1.00$, $p = 0.317$). In contrast, anaemia was not associated with antenatal anxiety (21.7% in anaemic vs 23.7% in non-anaemic women; $\chi^2 = 0.23$, $p = 0.628$).

None of the other haematological indices (MCV, MCH, MCHC, PCV, RBC, TLC, platelet count) differed significantly between cases and non-cases for either depression or anxiety (all $p > 0.16$). Likewise, none of the sociodemographic variables: age group, education, area of residence, parity, gravidity, trimester, or body-mass index was significantly associated with either outcome (Table III), although a non-significant gradient of decreasing depression with rising education was observed (illiterate 33.3% to postgraduate 12.5%; $p = 0.079$).

Table I. Sociodemographic, clinical and haematological characteristics of participants (N = 397)

Characteristic	n (%) or mean $\pm$ SD
Age (years)	28.3 $\pm$ 4.8
Residence: urban / rural	161 (40.6) / 236 (59.4)
Education: illiterate / under-matric / matric / intermediate / bachelors / postgraduate	39 (9.8) / 108 (27.2) / 110 (27.7) / 59 (14.9) / 49 (12.3) / 32 (8.1)
Gravidity: primigravida / multigravida	69 (17.4) / 328 (82.6)
Parity: nulliparous / primiparous / multiparous / grand-multiparous	98 (24.7) / 120 (30.2) / 167 (42.1) / 12 (3.0)
Trimester: first / second / third	62 (15.6) / 105 (26.4) / 230 (57.9)
BMI: underweight / normal / overweight / obese	21 (5.3) / 142 (35.8) / 140 (35.3) / 94 (23.7)
Haemoglobin (g/dL)	10.92 $\pm$ 1.28
Anaemia: none / mild / moderate / severe	194 (48.9) / 182 (45.8) / 19 (4.8) / 2 (0.5)

Table II. Anaemia status and antenatal depression and anxiety (N = 397)

Anaemia status	n	Antenatal depression, n (%)	Antenatal anxiety, n (%)
Non-anaemic (Hb ≥ 11 g/dL)	194	31 (16.0)	46 (23.7)
Anaemic (Hb < 11 g/dL)	203	50 (24.6)	44 (21.7)
χ^2 ($df = 1$); p		4.57; 0.033	0.23; 0.628

Table III. Association of sociodemographic factors with antenatal depression and anxiety (chi-square p-values)

Factor	Depression, p	Anxiety, p
Age group	0.807	0.180
Education	0.079	0.516
Residence (urban/rural)	0.470	0.903
Parity	0.406	0.301
Gravidity	0.197	0.403
Trimester	0.228	0.216
BMI category	0.284	0.726

Discussion

In this cohort of pregnant women from Kharian, anaemia was strikingly common, affecting just over half of all participants — a figure consistent with the very high prevalence of anaemia documented among pregnant women in Pakistan [5]. Against this background, the principal finding was that anaemic women had a significantly higher rate of antenatal depression than non-anaemic women (24.6% vs 16.0%). This is concordant with a case–control study from Lahore linking gestational iron-deficiency anaemia to antenatal depression [6] and with cohort evidence relating first-trimester anaemia to poorer maternal psychological health [7]. The association is biologically plausible, given iron's role in monoamine neurotransmitter synthesis and the fatigue and reduced oxygen-carrying capacity that accompany anaemia.

The relationship was specific to depression: anaemia showed no association with antenatal anxiety. A similar divergence has been reported elsewhere, and a prospective birth-cohort study found no link between gestational anaemia and depression at all [8], underlining that the evidence base remains mixed. Our own result was modest in magnitude and was significant only when anaemia was dichotomised as present or absent; the graded analysis did not reach significance, partly because few women had moderate or severe anaemia. The excess of depression was concentrated in the large group with mild anaemia, suggesting that even modest reductions in haemoglobin may be relevant to maternal mood.

By contrast, none of the sociodemographic factors examined: age, education, residence, parity, gravidity, trimester, or body-mass index was significantly associated with antenatal depression or anxiety, and no other haematological index distinguished cases from non-cases. The absence of demographic associations echoes work from rural Pakistan in which psychosocial rather than demographic factors predominated as predictors of prenatal depression [3], and argues against reliance on simple demographic criteria to identify women at risk.

These findings have practical implications. Anaemia is readily detected and treated in routine antenatal care, and its high prevalence in this population means that even a modest association with depression could be relevant at scale. Screening for and correcting anaemia may therefore offer a mental-health co-benefit alongside its established obstetric benefits, an opportunity that is especially valuable given the documented consequences of antenatal mood disorders for offspring development [4].

This study has limitations. Its cross-sectional design cannot establish temporality or causality; anaemia and depression may be linked bidirectionally, and reverse causation cannot be excluded. Anaemia was defined by haemoglobin alone, without ferritin, so an iron-deficiency aetiology could not be confirmed. Participants were recruited by convenient sampling from a single city, the HADS is a screening rather than diagnostic instrument, and the modest significance of the anaemia–depression association ($p = 0.033$) should be interpreted with caution in the context of multiple comparisons.

Conclusion

Anaemia affected half of the pregnant women studied in Kharian, Pakistan, and was significantly associated with antenatal depression, though not with anxiety, while sociodemographic and other haematological factors showed no significant association. Incorporating anaemia screening and treatment into antenatal care may yield mental-health benefits in addition to the well-recognised physical ones and merits prospective evaluation.

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