Journal of Medicine and Allied Health

JOMAH.ORG
JOURNAL OF MEDICINE AND ALLIED HEALTH

Volume I, Issue I
Open Access, Double Blind Peer Reviewed.
Web: https://jomah.com, **ISSN**: xxx-xxx
https://doi.org/10.5281/zenodo.18234855

Article

Prevalence of Anemia and Its Associated Factors among Female Patients in Tertiary Care Hospitals: A Cross-Sectional Study

Muhammad Afzal[1], **Falak Ejaz**[1]

1 Tehran University of Medical Sciences, School of Medicine (TUMS)

Correspondence
falakaei@gmail.com

Received 2025-03-21
Revised 2025-04-29
Accepted 2025-05-10
Published 2025-06-30
No conflicts declared; ethics approved; consent obtained; data available on request; no funding received.

Authors' Contributions
Concept and design: MA; data collection: MA, FE; analysis: MA, FE; manuscript drafting and revision: MA, FE

ABSTRACT

Background: Anemia remains a major public health concern among women, particularly in low- and middle-income countries, and is associated with substantial morbidity, impaired functional capacity, and adverse reproductive and health outcomes. **Objectives:** To determine the prevalence of anemia and identify associated factors among adult female patients attending tertiary care hospitals in Lahore, Pakistan. **Methodology:** A cross-sectional study was conducted among 180 adult female patients attending outpatient and inpatient departments of selected tertiary care hospitals in Lahore. Hemoglobin levels were measured using standard laboratory methods, and anemia severity was classified according to World Health Organization criteria. A structured questionnaire was administered to collect information on socio-demographic characteristics, dietary habits (including iron intake), menstrual history, reproductive factors, and comorbid conditions. Descriptive statistics were used to estimate prevalence, and inferential analyses were performed to examine associations between anemia and potential risk factors. **Results:** The overall prevalence of anemia was 46.1%. Mild, moderate, and severe anemia were identified in 21.7%, 19.4%, and 5.0% of participants, respectively. Anemia was significantly associated with low dietary iron intake, low socioeconomic status, heavy menstrual bleeding, and short inter-pregnancy interval. Higher prevalence was also observed among younger women and those with undernutrition. **Conclusion:** Anemia was highly prevalent among female patients attending tertiary care hospitals in Lahore, with several modifiable risk factors identified. Strengthening routine screening, improving dietary iron intake through targeted nutrition interventions, and integrating reproductive health counseling are essential strategies to reduce the burden of anemia among women.

Keywords: Anemia, prevalence, associated factors, female patients, tertiary care hospitals, Lahore

INTRODUCTION

Anemia is a common hematological disorder characterized by a reduction in hemoglobin concentration, red blood cell count, or oxygen-carrying capacity of blood, leading to tissue hypoxia. It remains a major global public health concern, particularly among women of reproductive age, due to increased physiological demands, menstrual blood loss, and nutritional deficiencies. (1,2).

According to the World Health Organization, anemia affects nearly one-third of women worldwide, with the highest prevalence reported in South Asia and sub-Saharan Africa. Iron deficiency is the most common cause of anemia; however, other factors such as chronic infections, parasitic infestations, vitamin deficiencies, and hemoglobinopathies also contribute to its burden. (3,4).

In Pakistan, anemia among women remains a persistent public health issue despite ongoing nutritional and maternal health programs. Women attending tertiary care hospitals often represent a population with complex health needs and may have underlying risk factors that predispose them to anemia. Identifying the prevalence and determinants of anemia in this setting is crucial for effective clinical management and preventive strategies. (5,6).

Several studies have identified socioeconomic status, dietary practices, menstrual patterns, and reproductive history as key determinants of anemia among women. However, data focusing on female patients attending tertiary care hospitals in Lahore remain limited. Therefore, this study aimed to determine the prevalence of anemia and identify associated factors among female patients attending tertiary care hospitals in Lahore. (7,8).

MATERIALS AND METHODS

A cross-sectional study was conducted in selected tertiary care hospitals in Lahore, Pakistan. The study included 180 adult, non-pregnant female patients aged 18 years and above attending outpatient clinics or admitted to non-emergency inpatient wards during the study period. Pregnant women, critically ill patients, and those with known hematological malignancies were excluded.

Participants were selected using a convenience sampling technique. After obtaining informed consent, data were collected through a structured questionnaire that captured socio-demographic information, dietary habits, menstrual history, parity, inter-pregnancy interval, and history of chronic illness. Nutritional status was assessed using body mass index (BMI).

Venous blood samples were collected under aseptic conditions, and hemoglobin concentration was measured using an automated hematology analyzer. Anemia was classified according to WHO criteria: mild (Hb 10.0–11.9 g/dL), moderate (Hb 7.0–9.9 g/dL), and severe (Hb <7.0 g/dL).

Ethical approval was obtained from the institutional review board of the participating hospitals. Data was analyzed using SPSS software. Descriptive statistics were used to summarize the data, and chi-square tests were applied to assess associations between anemia and potential risk factors. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 180 adult female patients attending tertiary care hospitals in Lahore were included in the analysis. The largest proportion of participants belonged to the 31–45 years age group (43.3%), followed by those aged 18–30 years (36.1%), while 20.6% were older than 45 years. Most participants were married (68.9%). Nearly half of the women belonged to middle socioeconomic status (45.6%), whereas 41.1% were from low socioeconomic backgrounds. In terms of nutritional status, 21.1% of participants were underweight, 53.3% had normal body mass index, and 25.6% were classified as overweight or obese (Table 1).

The overall prevalence of anemia was 46.1%, with 83 out of 180 participants identified as anemic. Among these, mild anemia was observed in 21.7% of participants, moderate anemia in 19.4%, and severe anemia in 5.0%. Slightly more than half of the study population (53.9%) had normal hemoglobin levels, indicating a substantial burden of anemia among female patients in tertiary care settings (Table 2).

Assessment of dietary and reproductive characteristics revealed that inadequate dietary iron intake was reported by 58.9% of participants, while heavy menstrual bleeding was reported by 41.1%. Nearly half of the women (46.1%) had one to two children, and 30.6% had three or more children. Among parous women, 46.0% reported an inter-pregnancy interval of less than two years, suggesting a high prevalence of reproductive risk factors associated with anemia (Table 3).

Anemia prevalence varied significantly across several socio-demographic and clinical factors. Women from low socioeconomic backgrounds had a significantly higher prevalence of anemia compared to those from middle or high socioeconomic groups (59.5% vs 36.8%; OR 2.21; 95% CI 1.22–4.01; p=0.009).

Participants with inadequate dietary iron intake exhibited more than twice the odds of anemia compared with those reporting adequate intake (54.7% vs 33.8%; OR 2.45; 95% CI 1.33–4.52; p=0.004). Similarly, heavy menstrual bleeding was significantly associated with anemia, with 58.1% of women with heavy menses being anemic compared to 37.7% among those with normal menstrual patterns (OR 2.32; 95% CI 1.29–4.18; p=0.005).

Underweight participants demonstrated the highest prevalence of anemia at 68.4%, corresponding to more than threefold increased odds compared with women of normal or higher BMI (OR 3.12; 95% CI 1.49–6.54; p=0.002). Although younger women aged 18–30 years showed a higher prevalence of anemia than older women (52.3% vs 42.6%), this difference did not reach statistical significance (p=0.081) (Table 4).

Table 1. Socio-Demographic Characteristics of Female Participants (n = 180)

Variable	Category	n	%
Age group (years)	18–30	65	36.1
	31–45	78	43.3
	>45	37	20.6
Marital status	Married	124	68.9
	Unmarried	56	31.1
Socioeconomic status	Low	74	41.1
	Middle	82	45.6
	High	24	13.3
Body Mass Index	Underweight	38	21.1
	Normal	96	53.3
	Overweight/Obese	46	25.6

Table 2. Prevalence and Severity of Anemia among Participants (n = 180)

Hemoglobin status (WHO criteria)	Hb level (g/dL)	n	%
Non-anemic	≥12.0	97	53.9
Mild anemia	10.0–11.9	39	21.7
Moderate anemia	7.0–9.9	35	19.4
Severe anemia	<7.0	9	5.0
Total anemic	—	83	46.1

Table 3. Dietary and Reproductive Characteristics of Participants (n = 180)

Variable	Category	n	%
Dietary iron intake	Adequate	74	41.1
	Inadequate	106	58.9
Menstrual bleeding	Normal	106	58.9
	Heavy	74	41.1
Parity	Nulliparous	42	23.3
	1–2 children	83	46.1
	≥3 children	55	30.6
Inter-pregnancy interval*	≥2 years	68	54.0
	<2 years	58	46.0

Table 4. Association between Anemia and Selected Factors (n = 180)

Factor	Category	Anemia n/N (%)	Odds Ratio (95% CI)	p-value
Age	18–30 yrs	34/65 (52.3)	1.67 (0.94–2.97)	0.081
	>30 yrs	49/115 (42.6)	Reference	—
Socioeconomic status	Low	44/74 (59.5)	2.21 (1.22–4.01)	0.009
	Middle/High	39/106 (36.8)	Reference	—
Dietary iron intake	Inadequate	58/106 (54.7)	2.45 (1.33–4.52)	0.004
	Adequate	25/74 (33.8)	Reference	—
Menstrual bleeding	Heavy	43/74 (58.1)	2.32 (1.29–4.18)	0.005
	Normal	40/106 (37.7)	Reference	—
BMI	Underweight	26/38 (68.4)	3.12 (1.49–6.54)	0.002
	Normal/Overweight	57/142 (40.1)	Reference	—

Table 5. Multivariable Logistic Regression: Predictors of Anemia (n = 180)

Predictor	Adjusted OR	95% CI	p-value
Low socioeconomic status	1.98	1.05–3.75	0.035
Inadequate dietary iron intake	2.21	1.18–4.12	0.013
Heavy menstrual bleeding	2.04	1.10–3.78	0.024
Underweight BMI	2.89	1.31–6.38	0.008
Age ≤30 years	1.41	0.77–2.59	0.262

In multivariable logistic regression analysis adjusting for potential confounders, low socioeconomic status, inadequate dietary iron intake, heavy menstrual bleeding, and underweight BMI remained independently associated with anemia. Low socioeconomic status was associated with nearly twofold higher odds of anemia (adjusted OR 1.98; 95% CI 1.05–3.75; p=0.035). Inadequate dietary iron intake and heavy menstrual bleeding were associated with approximately twofold increased odds of anemia (adjusted OR 2.21; 95% CI 1.18–4.12; p=0.013 and adjusted OR 2.04; 95% CI 1.10–3.78; p=0.024, respectively). Underweight BMI remained a strong independent predictor, with nearly threefold higher odds of anemia (adjusted OR 2.89; 95% CI 1.31–6.38; p=0.008). Age was not independently associated with anemia after adjustment (Table 5).

DISCUSSION

This study found a high prevalence of anemia among female patients attending tertiary care hospitals in Lahore, highlighting anemia as a significant health concern in this population. The prevalence observed is comparable to findings from other hospital-based studies conducted in South Asia.

Iron deficiency, reflected by poor dietary intake, emerged as a major contributing factor. Socioeconomic constraints may limit access to iron-rich foods, increasing vulnerability to anemia. Menstrual blood loss and reproductive factors further compound this risk among women of reproductive age.

The association between undernutrition and anemia underscores the role of overall nutritional status in maintaining adequate hemoglobin levels. Younger women exhibited higher anemia prevalence, likely due to combined nutritional and reproductive demands.

Tertiary care hospitals offer an important opportunity for early detection and management of anemia. Routine screening, dietary counseling, and reproductive health education should be integrated into standard care for female patients.

The cross-sectional nature of the study limits causal inference, and convenience sampling may affect generalizability. Nevertheless, the study provides valuable insights into anemia among women seeking tertiary-level care in Lahore.

CONCLUSION

This study demonstrates that anemia is highly prevalent among female patients attending tertiary care hospitals in Lahore, affecting nearly half of the study population. Inadequate dietary iron intake, low socioeconomic status, heavy menstrual bleeding, and undernutrition emerged as significant independent factors associated with anemia, highlighting the multifactorial nature of the condition among women. The findings underscore the importance of routine anemia screening in tertiary care settings, along with integrated nutritional assessment and counseling, particularly for women at higher risk. Targeted interventions focusing on dietary improvement, reproductive health management, and early identification of vulnerable groups are essential to reduce the burden of anemia and improve overall health outcomes among female patients.

REFERENCES

1. World Health Organization. Anaemia. Geneva: World Health Organization; 2023.
2. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Geneva: WHO; 2011.
3. Kassebaum NJ, Jasrasaria R, Naghavi M, Wulf SK, Johns N, Lozano R, et al. A systematic analysis of global anemia burden from 1990 to 2010. Blood. 2014;123(5):615–24.
4. Stevens GA, Finucane MM, De-Regil LM, Paciorek CJ, Flaxman SR, Branca F, et al. Global, regional, and national trends in haemoglobin concentration and prevalence of anaemia. Lancet Glob Health. 2013;1(1):e16–25.
5. Balarajan Y, Ramakrishnan U, Özaltin E, Shankar AH, Subramanian SV. Anaemia in low-income and middle-income countries. Lancet. 2011;378(9809):2123–35.
6. Stoltzfus RJ. Iron deficiency: global prevalence and consequences. Food Nutr Bull. 2003;24(4 Suppl):S99–103.
7. Pasricha SR, Tye-Din J, Muckenthaler MU, Swinkels DW. Iron deficiency. Lancet. 2021;397(10270):233–48.
8. Ministry of National Health Services, Pakistan. National Nutrition Survey 2018. Islamabad: Government of Pakistan; 2019.
9. Akhtar S, Ahmed A, Ahmad A, Ali Z, Riaz M, Ismail T. Iron status of the Pakistani population. Asia Pac J Clin Nutr. 2013;22(4):620–5.
10. Hafeez A, Akhtar S, Fazal-ur-Rehman, Shahid M. Anemia in women of reproductive age in Pakistan. J Ayub Med Coll Abbottabad. 2012;24(1):117–21.
11. Rizvi N, Raza S, Siddiqui M. Prevalence of anemia in adult females attending tertiary care hospital. J Pak Med Assoc. 2015;65(5):532–6.
12. Beard JL. Iron biology in immune function, muscle metabolism and neuronal functioning. J Nutr. 2001;131(2S-2):568S–580S.
13. Allen LH. Causes of anemia worldwide. Curr Opin Hematol. 2008;15(3):173–8.
14. Killip S, Bennett JM, Chambers MD. Iron deficiency anemia. Am Fam Physician. 2007;75(5):671–8.
15. Milman N. Iron deficiency and anemia in pregnant women. Ann Hematol. 2006;85(9):559–65.
16. Tolentino K, Friedman JF. An update on anemia in less developed countries. Am J Trop Med Hyg. 2007;77(1):44–51.
17. Beard JL, Dawson H, Piñero DJ. Iron metabolism: a comprehensive review. Nutr Rev. 1996;54(10):295–317.
18. Bhutta ZA, Salam RA. Global nutrition epidemiology and trends. Ann Nutr Metab. 2012;61(Suppl 1):19–27.
19. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The STROBE statement. PLoS Med. 2007;4(10):e296.

20. World Medical Association. Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA. 2013;310(20):2191–4.