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KNOWLEDGE, ATTITUDES, PRACTICES, AND ASSOCIATED DETERMINANTS OF ANEMIA AMONG WOMEN OF REPRODUCTIVE AGE

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ABSTRACT

Anemia remains a major public health problem among women of reproductive age in India. This multicentric cross-sectional study assessed the prevalence of anemia, knowledge, attitudes, practices, and associated determinants among women aged 15-49 years attending tertiary care centres in North India. A total of 420 women were enrolled, and data were collected using a structured questionnaire along with hemoglobin estimation. Anemia was present in 62.4% of participants, with mild, moderate, and severe anemia observed in 28.1%, 26.0%, and 8.3%, respectively. Although 58.1% of women demonstrated adequate knowledge regarding anemia, only 41.7% followed appropriate preventive practices. Low educational status, low socioeconomic status, multiparity, inadequate dietary iron intake, and poor compliance with iron-folic acid supplementation were independently associated with anemia. The findings highlight a substantial knowledge-practice gap and underscore the need for integrated nutritional, behavioral, and health system interventions to reduce the burden of anemia among women of reproductive age.

Keywords: Anemia; Women of reproductive age; Knowledge, attitudes and practices; Determinants; North India.

INTRODUCTION

One of the most common nutritional deficiency disorders worldwide is anemia, and it continues to be a significant public health issue, especially in low and middle-income countries.[1] Due to physiological phenomena such as menstrual blood loss, increased nutritional needs during pregnancy and lactation, and sociocultural factors related to diet and healthcare access, women of reproductive age (WRA) i.e., women in the age group of 15-49 years lose blood during this phenomenon and are also restricted in terms of diet and healthcare.[2,3]

Anemia is a worldwide health issue, and nearly 33% of women in the reproductive age group are anemic, with South Asia bearing the brunt of this issue.[4]

The public health initiatives in India over the years fail to bring down the high prevalence of the issue, as studies show that India carries a high burden of the issue.[5] Anemia among women results in a variety of adverse reproductive health problems including low and high birth weight babies, pre-term deliveries, increased maternal morbidity and mortality, and the women also face loss of work capacity, cognitive impairment and high infection susceptibility.[6-8]

Anemia has multiple causes; Iron Deficiency is however the most common cause among women. In the Indian context, the causes are more likely to also include Deficiencies of Folate and Vitamin B12, Persistent infections, Parasitic infections and Defects in the structure of Hemoglobin. In a bid to combat the problem of anemia as a public health issue, the India government has set up several initiatives including the National Iron Plus Initiative and Anemia Mukt Bharat, which aim at managing the prevalence of Anemia at various stages of the life cycle. Sociocultural factors, lack of knowledge, poor adherence, and poor compliance, have been cited as major factors that have limited the efficacy of these initiatives.

Knowledge, Attitudes, and Practices (KAP) related to Anemia are among the most important factors to consider when designing interventions; Iron Supplementation, Dietary Behavior, and Health-seeking Behavior among other things, will depend on KAP surrounding these issues. While knowledge is a prerequisite to these behaviors, KAP is however more than necessary. Ultimately, Anemia is a reflection of several other factors including education level, service accessibility The cost of services, Dietary habits, an individual's healthcare, the number of children, as well as Anemia. While the importance of KAP as a gap measure on the knowledge-action continuum is undeniable, other factors around anemia like its direct and indirect causes as well as the prevailing factors in a region are important gaps to consider.

The data available for North India is limited on KAP and KAP related determinants of anemia for women of reproductive age. Therefore, this multicentric study was conducted to evaluate the knowledge, attitudes, and practices of women related to anemia and the socio-demographic and clinical determinants associated with anemia among women visiting tertiary care centres in North India.

MATERIALS AND METHODS

Study Design and Setting: A multicentric hospital-based cross-sectional study conducted from January 2024 to December 2024 at three tertiary care medical colleges in Uttar Pradesh.

Study Population

Women aged 15-49 years attending outpatient departments.

Sample Size

Based on an expected anemia prevalence of 60%, confidence level of 95%, and 5% absolute precision, the minimum calculated sample size was 369. After adjusting for non-response, 420 participants were enrolled.

Statistical Analysis

Data were analyzed using SPSS version 26. Multivariate logistic regression identified independent determinants of anemia. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 420 women of reproductive age (15-49 years) were included in the study across three tertiary care centres of North India.

Socio-Demographic Characteristics

The mean age of the participants was 29.8 ± 7.6 years. The majority of women belonged to the 21-30 years age group (38.6%). More than half of the participants were from rural areas (61.9%), and 54.3% belonged to the lower socioeconomic class. Nearly half of the women (47.1%) had education up to primary level or were illiterate.

Table 1 summarizes the socio-demographic profile of the study participants.

Table 1: Socio-Demographic Characteristics of Study Participants (n = 420)

Variable	Category	Frequency	Percentage
Age (years)	15-20	52	12.4
	21-30	162	38.6
	31-40	128	30.5
	41-49	78	18.6
Residence	Rural	260	61.9
	Urban	160	38.1
Education	Primary or below	198	47.1
	Secondary	142	33.8
	Graduate & above	80	19.1
Socioeconomic status	Lower	228	54.3
	Middle	132	31.4
	Upper	60	14.3
Parity	Nulliparous	96	22.9
	Multiparous	324	77.1

Prevalence and Severity of Anemia

Out of 420 participants, 262 women (62.4%) were found to be anemic. Among them, 28.1% had mild anemia, 26.0% had moderate anemia, and 8.3% had severe anemia.

Severity-wise distribution of anemia is shown in Table 2.

Table 2: Prevalence and Severity of Anemia among Participants (n = 420)

Hemoglobin status	Frequency	Percentage
Non-anemic	158	37.6
Mild anemia	118	28.1
Moderate anemia	109	26.0
Severe anemia	35	8.3
Total anemic	262	62.4

Knowledge Regarding Anemia

Knowledge assessment revealed that 65.2% of participants correctly identified iron deficiency as a major cause of anemia, while 59.5% were aware of iron-rich dietary sources. Knowledge regarding complications of anemia was comparatively lower (43.8%). Awareness about government-run iron supplementation programs was reported by 48.6% of women.

Overall, 58.1% of participants demonstrated adequate knowledge regarding anemia.

Details are presented in Table 3.

Table 3: Knowledge Regarding Anemia among Study Participants (n = 420)

Knowledge variable	Correct response n (%)
Knows anemia causes	274 (65.2)
Knows iron-rich foods	250 (59.5)
Knows symptoms of anemia	238 (56.7)
Knows complications	184 (43.8)
Aware of government programs	204 (48.6)
Adequate knowledge score	244 (58.1)

Attitudes Towards Anemia

A positive attitude towards anemia prevention was observed in 69.3% of women, who perceived anemia as a serious health problem. About 52.6% believed that iron supplementation is necessary even in the absence of symptoms, while 61.4% expressed willingness for regular hemoglobin screening.

Attitudinal responses are summarized in Table 4.

Table 4: Attitudes Towards Anemia (n = 420)

Attitude statement	Positive response n (%)
Anemia is a serious health issue	291 (69.3)
Iron tablets needed without symptoms	221 (52.6)
Willing for Hb testing	258 (61.4)
Willing to modify diet	244 (58.1)

Practices Related to Anemia Prevention

Only 46.2% of participants reported regular consumption of iron-rich foods. Compliance with iron-folic acid (IFA) supplementation was observed in 38.9%, and 44.5% sought medical consultation for anemia-related symptoms. Overall, 41.7% of participants demonstrated appropriate preventive practices.

Practice-related findings are shown in Table 5.

Table 5: Practices Related to Anemia Prevention (n = 420)

Practice variable	Yes n (%)
Regular iron-rich diet	194 (46.2)
Compliance with IFA tablets	163 (38.9)
Regular health check-ups	172 (41.0)
Sought care for symptoms	187 (44.5)
Appropriate practice score	175 (41.7)

Determinants Associated with Anemia

On multivariate logistic regression analysis, low educational status, low socioeconomic class, multiparity, inadequate dietary iron intake, and non-compliance with iron supplementation were found to be independently associated with anemia. Table 6 presents the determinants of anemia.

Table 6: Multivariate Analysis of Factors Associated with Anemia

Determinant	Adjusted Odds Ratio (AOR)	95% CI	p-value
Low education	2.1	1.3-3.4	0.003
Low socioeconomic status	2.6	1.6-4.1	<0.001
Multiparity	1.9	1.1-3.1	0.012
Poor dietary iron intake	3.2	2.0-5.1	<0.001
Non-compliance with IFA	2.8	1.7-4.6	<0.001

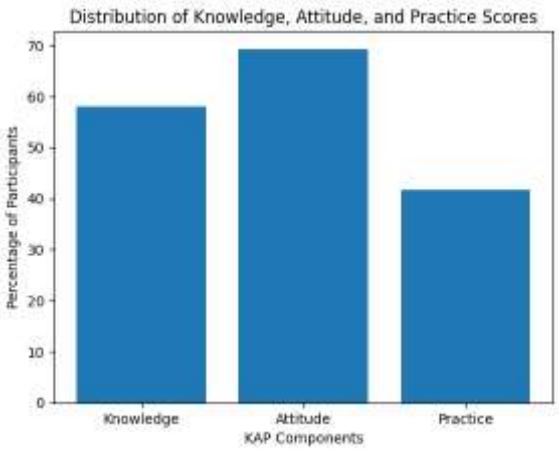

Figure 1: Distribution of knowledge, attitude, and practice scores regarding anemia among women of reproductive age (n = 420)

DISCUSSION

The present multicentric study highlights anemia as a persistent public health concern among women of reproductive age attending tertiary care centres in North India, with an overall prevalence of 62.4%. This finding is consistent with national and regional estimates reported in population-based surveys and hospital-based studies from India, which have documented anemia prevalence ranging from 50% to 70% in this population.[1,4,5] Recent multicentric studies from North India have also reported comparable prevalence, underscoring the limited impact of ongoing interventions on reducing the anemia burden.[17]

The predominance of mild and moderate anemia observed in the present study is in agreement with earlier Indian and global studies.[3,6] This distribution suggests that a significant proportion of affected women could benefit from timely dietary interventions and iron supplementation. However, the presence of severe anemia in 8.3% of participants is clinically concerning, as severe anemia has been associated with increased maternal morbidity, adverse pregnancy outcomes, and higher healthcare utilization.[7,8]

Socio-demographic factors emerged as significant determinants of anemia. Women with lower educational status and lower socioeconomic background had significantly higher odds of anemia. Education influences nutritional awareness, health literacy, and utilization of healthcare services, while socioeconomic status determines food security and dietary diversity. These findings corroborate earlier evidence demonstrating strong social gradients in anemia prevalence among Indian women.[2,9] Analysis of recent NFHS-5 data has further highlighted persistent socioeconomic inequalities in anemia despite national nutrition programs.[18]

Multiparity was independently associated with anemia in the present study, reflecting cumulative nutritional depletion associated with repeated pregnancies and inadequate inter-pregnancy spacing. Similar associations have been documented in previous studies, emphasizing the need for effective postnatal nutritional support and family planning services.[6,10]

Although 58.1% of participants demonstrated adequate knowledge regarding anemia, only 41.7% followed appropriate preventive practices, revealing a substantial knowledge-practice gap. This disconnect has been widely reported in earlier studies and remains a major barrier to anemia control.[11] Recent studies from North India have reiterated that awareness alone does not ensure behavioral change unless reinforced by sustained counseling and supportive health systems.[19]

Compliance with iron-folic acid supplementation was particularly low in the present study. Poor adherence has been attributed to side effects, misconceptions, lack of motivation, and inadequate counseling, as reported in both earlier Indian studies and recent global analyses.[12,20] Strengthening counseling services and follow-up mechanisms is therefore essential to improve supplementation adherence.

Dietary inadequacy was another important determinant, with poor intake of iron-rich foods showing a strong association with anemia. This finding reflects prevailing dietary patterns characterized by low consumption of heme iron, high phytate content, and limited dietary diversity, especially among socioeconomically disadvantaged women.[13] Recent nutrition transition studies continue to emphasize the need for dietary diversification and improved bioavailability of micronutrients.[21]

Overall, the findings of the present study reaffirm that anemia among women of reproductive age is a multifactorial condition influenced by biological, social, and behavioral determinants. Addressing anemia effectively requires integrated strategies that combine nutritional interventions, behavior change communication, and strengthened health system responses rather than isolated biomedical approaches.

CONCLUSION

Anemia remains highly prevalent among women of reproductive age in North India despite moderate awareness levels. The significant gap between knowledge and preventive practices, coupled with socioeconomic and reproductive determinants, highlights the need for integrated nutrition, behavior-focused, and health-system interventions to effectively reduce the burden of anemia.

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