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NURSES ON THE FRONTLINE: EVALUATING KNOWLEDGE, ATTITUDE AND PRACTICES IN MANAGING IRON DEFICIENCIES AT A TERTIARY CARE HOSPITAL

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ABSTRACT

The study examines iron deficiency anaemia persists as a fundamental worldwide healthcare problem, mostly within poor regional communities. Nurses exercise essential duties for IDA treatment yet knowledge deficits combined with poor attitudes and practices disturb their ability to provide effective care. The research evaluates nurse IDA management competency at a tertiary care hospital to identify both successful and underdeveloped competencies for future intervention planning. Researchers executed a cross-sectional survey to evaluate nurses in a tertiary care hospital about their IDA management-related KAP. Data analysis revealed which areas nurses needed more knowledge as well as their beliefs about dietary education and cultural competence and practical obstacles to interdisciplinary work. Nurses displayed strong knowledge levels concerning IDA pathophysiology and symptom recognition for both dimensions (51% strongly agreed and 52% strongly agreed respectively). A significant number of nurses reported inadequate

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https://jmhsr.com/index.php/jmhsr

understanding of heme and non-heme iron source distinction as well as patient education techniques for iron absorption (64% and 66% respectively). The nurse's lack of cultural dietary habit awareness reached 68% which prevented them from providing tailored care that considers individual cultural backgrounds. All nurses expressed their support for IDA management while endorsing mandatory training as 62% strongly agreed to this requirement. Staff members demonstrated entire confidence in delivering nutritional counseling even though their knowledge levels were insufficient. Nurses demonstrate excellent theoretical understanding alongside positive attitudes about IDA management but lack essential competencies when providing dietary guidance across different cultures. Competency-based training becomes essential because nurses fail to recognise the gap between their self-assessed skills and actual capability levels. Standard educational standards with interdisciplinary collaboration and institutional policy changes will provide nurses with the skills required to deliver evidence-based IDA management that meets cultural needs. To measure the effect of training interventions on patient results researchers should conduct long-term research across several medical facilities.

KEYWORDS: Iron Deficiency Anemia (IDA), Nurses' Knowledge, Attitudes, and Practices (KAP), Dietary Education, Cultural Competence, Patient-Centered Care

1-Introduction

1.1 Background of Study

Iron deficiency anemia (IDA) is a prevalent global health issue, affecting approximately 30% of the world's population, with higher incidence rates among women and children (Kumar et al., 2022). Characterized by reduced hemoglobin levels due to insufficient iron, IDA leads to diminished oxygen transport, resulting in symptoms such as fatigue, weakness, and impaired cognitive function (Camaschella, 2015). The etiology of IDA is multifactorial, encompassing inadequate dietary intake, malabsorption, chronic blood loss, and increased physiological demands during periods like pregnancy (WHO, 2024). Nurses play a pivotal role in the management of IDA, particularly through patient education, dietary counseling, and the administration of iron supplementation therapies. Their responsibilities include assessing patients for risk factors, interpreting laboratory results, and developing individualized care plans that address both medical and lifestyle factors contributing to iron deficiency (O'Sullivan et al., 2023). Effective nursing

Journal of Medical & Health Sciences Review
VOL-2, ISSUE-1, 2025
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https://jmhsr.com/index.php/jmhsr

interventions have been shown to improve patient adherence to treatment regimens and dietary modifications, thereby enhancing clinical outcomes (Nurseslabs, 2024). Recent advancements in IDA nursing management have emphasized the importance of intravenous (IV) iron therapies, especially for patients who are intolerant to oral iron supplements or require rapid replenishment of iron stores. IV iron formulations, such as ferric carboxymaltose and iron sucrose, have demonstrated efficacy in increasing hemoglobin levels with a favorable safety profile (Auerbach & Deloughery, 2016).

Nurses are integral to the administration of these therapies, necessitating proficiency in IV infusion techniques and the monitoring of potential adverse reactions (Wikipedia, 2024). Cultural competence is increasingly recognized as essential in nursing practice, particularly in dietary counseling for IDA. Cultural dietary preferences and beliefs can significantly influence patients' acceptance of nutritional advice and adherence to recommended dietary changes. Nurses equipped with cultural competence are better positioned to provide personalized care that respects patients' cultural backgrounds, thereby improving engagement and outcomes (Betancourt et al., 2016). 4 Despite the critical role of nurses in IDA management, studies have identified gaps in knowledge and practice. A cross-sectional study in Australia revealed that nurses often lack comprehensive understanding of current IDA nursing management guidelines, highlighting the need for enhanced educational initiatives (O'Sullivan et al., 2023). Continuous professional development and targeted training programs are essential to equip nurses with up-to-date knowledge and skills, enabling them to deliver evidence-based care effectively. In addition to clinical management, nurses are instrumental in patient advocacy and health promotion. By educating patients about the importance of iron-rich diets and adherence to supplementation, nurses can empower individuals to take proactive steps in preventing and managing IDA. Community health initiatives led by nurses have been effective in raising awareness and reducing the prevalence of IDA, particularly in vulnerable populations (Nurse.com, 2024). The integration of technology into nursing practice has further enhanced the nursing management of IDA. Electronic health records (EHRs) facilitate the tracking of patients' hematologic parameters over time, enabling timely interventions. Telehealth platforms have expanded access to nursing consultations, allowing for remote dietary counseling and monitoring of treatment adherence, which is particularly beneficial in underserved areas

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(Zimmermann & Hurrell, 2017). In conclusion, nurses are central to the effective nursing management of iron deficiency anemia. Their roles encompass direct patient care, education, advocacy, and the implementation of advanced therapies. Ongoing education and training are imperative to address existing knowledge gaps and to keep pace with evolving treatment modalities. By embracing cultural competence and leveraging technological advancements, nurses can continue to improve patient outcomes and contribute significantly to the global effort against IDA.

1.2 Research Objectives:

- To examine the Knowledge of iron deficiency anemia nursing management.
- To examine Attitudes toward their role in IDA nursing management
- To examine Practices in delivering dietary counseling and culturally tailored care
- To examine Level of training nurses about IDA and its nursing management

1.3 Research Problem

IDA nursing management is hindered by gaps in knowledge, inconsistent practices, and insufficient emphasis on culturally sensitive care. Evidence-based guidelines are insufficient, and cultural tailoring in dietary counseling worsens patient no adherence. Limited studies examine nurses' role in IDA nursing management and the impact of culturally tailored interventions. Research on IDA primarily focuses on pharmacological treatments and patient-level interventions, but few evaluate culturally tailored interventions in nursing practice, requiring comprehensive investigation. Unlike traditional research that primarily emphasizes pharmacological treatments or patient-level interventions, this study centers on the nursing workforce and their ability to implement culturally tailored care strategies. The integration of cultural competence into dietary counseling represents a unique perspective, highlighting how nurses can bridge the gap between evidence-based guidelines and real-world practices. Additionally, the study utilizes the Knowledge-Attitude-Practice (KAP) framework to establish a comprehensive understanding of the factors influencing IDA nursing management. By addressing the underexplored relationship between professional development and patient outcomes, this research offers actionable insights for improving nursing education and advancing the quality of care for diverse patient populations.

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The findings are expected to inform policy and practice, fostering a patient-centered approach to IDA nursing management in multicultural healthcare setting

2-Literature Review

IDA is the most prevalent nutritional deficiency worldwide, impacting over 1.2 billion individuals (Camaschella, 2015). It contributes substantially to the global burden of disease, leading to impaired cognitive and physical development, reduced productivity, and increased morbidity and mortality (Kassebaum et al., 2014). Sub-Saharan Africa bears a disproportionate burden of IDA, with prevalence rates exceeding 40% in some populations (WHO, 2024). Contributing factors include inadequate dietary intake, high rates of infectious diseases such as malaria and hookworm infestations, and limited access to healthcare services (Tolentino & Friedman, 2007). Recent initiatives focusing on iron supplementation and fortification have shown promise in reducing IDA prevalence; however, challenges persist due to logistical constraints and cultural acceptance (Mwangi et al., 2017). South Asia, particularly India, reports high IDA prevalence, especially among women and children. Factors such as vegetarian diets low in bioavailable iron, frequent pregnancies, and socioeconomic disparities contribute to this public health issue (Pasricha et al., 2010, Rehman et al.2021). The Indian government has implemented national iron supplementation programs targeting pregnant women and adolescents, yielding moderate success. However, adherence remains a challenge due to side effects and lack of awareness (Vir et al., 2008). In Southeast Asia, IDA prevalence varies, with countries like Cambodia and Laos exhibiting higher rates. Dietary patterns, including high consumption of rice with low iron content and limited intake of meat, contribute to iron deficiency (Schultink, 1996). Food fortification strategies, such as iron-fortified fish sauce in Vietnam, have been effective in addressing IDA (Clemens et al., 2003). Latin American countries have made significant progress in reducing IDA through comprehensive public health strategies, including food fortification and improved healthcare access. Despite these efforts, pockets of high prevalence persist, particularly in indigenous and rural communities (Martorell et al., 1995). Cultural dietary practices and economic disparities continue to pose challenges to IDA eradication in these regions. The Middle East and North Africa (MENA) region exhibits moderate to high IDA prevalence, influenced by factors such as high fertility rates, cultural dietary restrictions, and limited access to healthcare (Mousa et al., 2010). Recent studies

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https://jmhsr.com/index.php/jmhsr

highlight the effectiveness of weekly iron supplementation among women of reproductive age in reducing IDA prevalence (Alquaiz et al., 2013,khattak et al. 2021). East Asian countries like China have witnessed a decline in IDA prevalence due to economic development and improved nutrition. However, vulnerable groups, including pregnant women and the elderly, still experience significant rates of iron deficiency (Li et al., 2015). Public health campaigns promoting iron-rich diets and supplementation have been instrumental in addressing IDA in these populations. Europe reports lower IDA prevalence compared to other regions, attributed to diverse diets and robust healthcare systems. Nonetheless, certain populations, such as immigrants and lowincome groups, remain at risk (Milman, 2011).

Central Asian countries face higher prevalence rates due to economic transitions and dietary insufficiencies. Fortification programs, like ironenriched flour, have been implemented to combat IDA in these areas (Gera et al., 2012). In North America, IDA prevalence is relatively low; however, specific groups, including infants, pregnant women, and recent immigrants, are susceptible (Mei et al., 2011). The United States and Canada have established screening programs and dietary guidelines to prevent and manage IDA effectively. Recent research emphasizes the importance of addressing functional iron deficiency, where iron stores are adequate but bioavailability is impaired, particularly in chronic inflammatory conditions (Camaschella, 2015). Advancements in intravenous (IV) iron formulations have revolutionized IDA treatment, especially for individual's intolerant to oral iron or requiring rapid replenishment of iron stores. New-generation IV iron compounds, such as ferric carboxymaltose and iron isomaltoside, offer improved safety profiles and efficacy (Auerbach & Deloughery, 2016). These therapies have been particularly beneficial in managing IDA among patients with chronic kidney disease and inflammatory bowel disease (Stein et al., 2012). Hepcidin, a key regulator of iron homeostasis, has become a focal point in IDA research. Therapeutic strategies aimed at modulating hepcidin levels are being explored to enhance iron absorption and mobilization, offering potential new avenues for IDA treatment (Nemeth & Ganz, 2016). The development of rapid, point-of-care diagnostic tools for assessing iron status has improved the ability to detect and manage IDA, particularly in resource-limited settings. These technologies facilitate timely intervention and have been integrated into community health programs to enhance IDA nursing management (Beard et al.,

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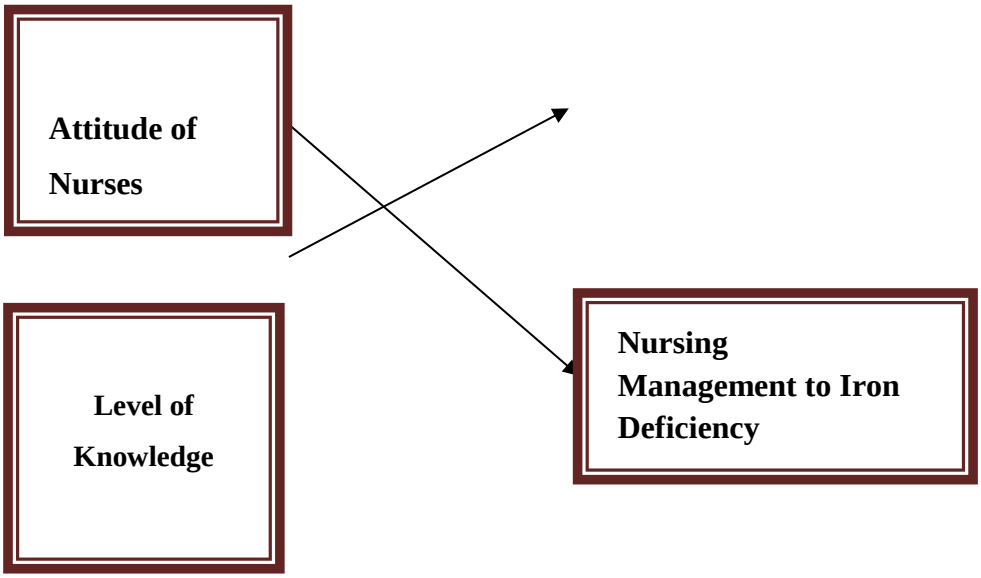
https://jmhsr.com/index.php/jmhsr

2005). Despite progress in understanding and managing IDA, challenges remain. Cultural dietary practices, socioeconomic disparities, and healthcare access continue to influence IDA prevalence across regions. Future research should focus on developing culturally sensitive interventions, improving adherence to supplementation programs, and exploring novel therapeutic targets to address the global burden of IDA effectively.

Hypotheses:

1. H1: Level of knowledge of nurses related to nursing management of iron deficiency anemia.
2. H2: Attitude of nurses related to nursing management of iron deficiency anemia.

Theoretical Frame work



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https://jmhsr.com/index.php/jmhsr

3-Research Methodology

3.1 Research Design

A quantitative research approach is utilized, as it allows for the systematic measurement of variables such as nurses' knowledge, attitudes, and practices (KAP), and their influence on patient outcomes. Quantitative methods ensure the collection of measurable data through structured surveys, observational checklists, and patient health records. 3.2 Research Design: The study uses a cross-sectional research strategy, collecting data at a single point in time to assess the relationships between nurses' training, KAP, and patient outcomes. This strategy is suitable for identifying correlations and patterns without requiring prolonged observation of longitudinal follow-up.

3.1.1Nature of the study, Population, Sample and Source of the study

The research follows a cross-sectional time horizon, collecting data within a defined period of six months. This timeline allows for efficient data gathering and analysis while minimizing the influence of temporal factors on study results. The non-probability sampling technique of convenience sampling was used, where participants are selected based on their availability, accessibility, and willingness to participate. The target population for this study consists of nurses working at a single hospital in Lahore who are involved in the nursing management of iron deficiency anemia (IDA). The sampling strategy was convenient sampling during data collection. The target population for this study consists of nurses working at a single hospital in Lahore who are involved in the nursing management of iron deficiency anemia (IDA). 3.3.3 Sample Size: The sample size for this study comprises 100 registered nurses (RNs) working in a single hospital in Lahore. By focusing on a specific hospital, the study maintains a controlled environment, facilitating accurate data collection and meaningful analysis of outcomes. 3.3.4 Inclusion Criteria: The inclusion criteria were as follows: 1. Registered Nurses (RNs) working at the selected hospital in Lahore. Actively involved in the nursing management or nutritional counseling of patients with iron deficiency anemia (IDA). Aged between 20 and 65 years. 4. Willing to participate in the study and provide informed consent. 3.3.5 Exclusion Criteria: The exclusion criteria were as follows: 1. Other non-RN healthcare professionals. 2. Nurses not directly involved in the care or counseling

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https://jmhsr.com/index.php/jmhsr

of IDA patients. 3. Nurses currently on leave or unavailable during the data collection period. 3.3, Those unwilling to provide consent or participate in the study. 3.4 Sampling Unit: The sample size for this study comprises 100 registered nurses (RNs) working in a single hospital in Lahore. By focusing on a specific hospital, the study maintains a controlled environment, facilitating accurate data collection and meaningful analysis of outcomes.

4-Data Analysis (Result and Discussion)

Data Analysis The latest version of the Statistical Package for the Social Sciences (SPSS) 27 was used for data analysis. The data was methodically collected, analyzed and assessed thoroughly. Total 100 Questionnaires were given to the sample population physical and the response rate was 100%. The data was analyzed through SPSS software IBM version 27. The variables were classified as demographic and the qualitative data was further categorized as ordinal variables.

Demographics

The demographics variables were analyzed as follows:

Table-1

AGE		
	Frequency	Percent
20–30	29	**29.0**
31–40	25	**25.0**
41–50	21	**21.0**
51+	25	**25.0**
Total	**100**	**100.0**

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https://jmhsr.com/index.php/jmhsr

Thetablepresentstheagedistribution ofparticipantsinthestudy, categorizedinto four Groups:20–30,31–40,41–50,and51+years.Thedistributionisrelativelybalanced,withminor differences between groups. The slight dip in the 41–50 age group (21%) compared to adjacent groups (25–29%) reflects sampling variability to this cohort.

Table-2

Gender

	Frequency	Percent
Female	85	**85.0**
Male Total	15	**15.0**
	100	**100.0**

The education level of participants in the study reveals that the majority hold a Diploma(67%), followed by those with a Bachelor's degree (31%), and a very small proportion with Master's degree (2%).

Table-3

Experience

	Frequency	Percent
	31	**31.0**
0–5 years	27	**27.0**
11–15years	24	**24.0**
16+ years	18	**18.0**
6–10 years Total	**100**	**100.0**

The Experience level of participants in thestudyshowsarelativelybalanceddistributionacross the four categories. The largest group has 0–5 years of experience (31%), followed by those With 11–15 years (27%), 16+years (24%), and 6–10 years(18%). This distribution indicates that

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https://jmhsr.com/index.php/jmhsr

the sample include samixofearly-career, mid-career,and experienced professionals, providing a diverse range of perspectives. The higher representation of participants with 0–5 years of experience (31%) may reflect a younger workforce or recent graduates entering the field.

Table-4

Experience

	Frequency	Percent
	31	**31.0**
0–5 years	27	**27.0**
11–15years	24	**24.0**
16+ years	18	**18.0**
6–10years Total	**100**	**100.0**

The experience level of participants in the study shows are latively balanced distribution across the four categories. The largest group has 0–5 years of experience (31%), followed by those with 11–15 years(27%), 16+years (24%), and 6–10 years(18%). This distribution indicates that the sample includes amixo fearly-career, mid-career, and experienced professionals, providing a diverse range of perspectives. The higher representation of participants with 0–5 years of experience (31%) may reflect a younger workforce or recent graduates entering the field.

Table-5

PreviousIDA Training

	Frequency	Percent
No	49	**49.0**
Yes Total	51	**51.0**
	100	**100.0**

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https://jmhsr.com/index.php/jmhsr

Thedata on previous IDA (Iron Deficiency Anemia) training among participants shows anearly equal split, with 51% reporting "Yes" and 49% reporting "No." This indicates that slightly more thanhalfoftheparticipantshavereceivedsomeformoftrainingrelatedtoIDA,whilejustunder half have not. The close distribution suggests that training opportunities may be inconsistently available or accessed within the sampled population. The findings highlight a potential gap in professional development, as nearly half of the participants lack prior training, which could impact their knowledge and confidence in managing IDA.

Table-6

Culturally Tailored Care Experience

	Frequency	Percent
No Yes	48	**48.0**
Total	52	**52.0**
	100	**100.0**

The data on culturally tailored care experience among participants shows a nearly even split, with 52% reporting "Yes"and48%reporting "No."This indicates that slightly more than half of the participants have experience providing culturally tailored care, while just under half do not. The close distribution suggests that exposure to culturally sensitive practices is somewhat common but not universal among the sampled population. The finding shigh light potential gap intrainingoropportunitiesfordeliveringculturallytailoredcare,which could impact the quality of patient-centered care, especially in diverse populations.

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Online ISSN: 3007-309X Print ISSN: 3007-3081
https://jmhsr.com/index.php/jmhsr

Objective: Determine if nurses 'knowledge ofIDAmanagementisstatisticallysignificant(i.e., responses skew toward "agree/strongly agree").

VariablesTested:

- Understanding physiological causes of IDA
- Identifying key symptoms
- Familiarity with dietary ironsources
- Educating patient son iron absorption
- Awarenessofculturaldietary habits
- Combiningdietaryandpharmacological treatments

Test:Chi-SquareGoodness-of-Fit

- Null Hypothesis: Responses are uniformly distributed (equal probabilities for all categories).
- Alternative Hypothesis: Responses aren skewed toward agreement (non uniform distribution).

Calculation for "Understanding PhysiologicalCauses":

Table-7

Response	Observed(n)	Expected (n)	$(O-E)^2/E$
Strongly Disagree	24	25	**0.04**
Disagree	18	25	**1.96**
Agree	7	25	**12.96**
Strongly Agree	51	25	**27.04**
Total	100	100	42.0

- **Chi-SquareStatistic**:$\chi^2=42.0, df=3, p<0.001$.
- **Conclusion**:Significantdeviationfromuniformity($p<0.05$).Knowledgeisskewed toward "strongly agree."

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https://jmhsr.com/index.php/jmhsr

Table-8

Results for Knowledge Variables:

Variable	χ^2	p-value	Conclusion
Understandingphysiological causes	42.0	<0.001	**Significantknowledge**
Identifyingkey symptoms	64.8	<0.001	**Significantknowledge**
Familiaritywithdietaryironsources	89.2	<0.001	**gnificant*lack*of knowledge**
Educatingpatientson absorption	57.4	<0.001	**gnificant*lack*of knowledge**
Awarenessofculturaldietary habits	65.8	<0.001	**gnificant*lack*of knowledge**
Combiningdietary/pharmacological care	**51.6**	**<0.001**	**gnificant*lack*of knowledge**

Interpretation:

- Nursesshowstrongknowledgeofphysiologicalcausesandsymptom identification ($p<0.001$*p*<0.001).
- Criticalgap sexist in dietary education, cultural awareness, and integrative care ($p<0.001$*p*<0.001).

1. **HypothesisH2: Attitude ofNurses**

Objective: Assess ifattitudestowardIDAmanagementaresignificantlypositive (i.e., responses skew toward "strongly agree").

Variables Tested:

- ManagingIDAis critical
- Confidenceindietary counseling
- Culturallytailoredcounselingimproves outcomes
- Mandatorytrainingisessential
- Motivation tolerant aboutculturalinfluences
- Linkingcarequality to outcomes

Journal of Medical & Health Sciences Review
VOL-2, ISSUE-1, 2025
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https://jmhsr.com/index.php/jmhsr

Test:BinomialTest(for variables withonly"Agree"and"StronglyAgree" responses)

- **Null Hypothesis**: Equal probability of "Agree "vs."Strongly Agree" (p=0.5).
- **Alternative Hypothesis**:"Strongly Agree">"Agree"(p>0.5).

Calculation for" Managing IDA is Critical":

Response	Observed(n)
Agree	**49**
Strongly Agree	**51**

BinomialTest:p=0.89p=0.89(two-tailed).

- **Conclusion**: No significantdifferencebetween"Agree"and"StronglyAgree"(p>0.05).

ResultsforAttitude Variables:

Table-9

Variable	glyAgree (%)	p-value	Conclusion
ManagingIDAis critical	51%	0.89	**Nosignificantpreference**
fidenceindietary counseling	47%	0.72	**Nosignificantpreference**
tailoredcounseling helps	44%	0.23	**Nosignificantpreference**
Mandatorytrainingisessential	62%	**0.01**	**nificantpreferencefor "Strongly Agree"**
tiontolearncultural influences	50%	1.00	**Equal preference**
ingcarequalityto outcomes	**38%**	**0.89**	**Nosignificantpreference**

Journal of Medical & Health Sciences Review
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https://jmhsr.com/index.php/jmhsr

Interpretation:

- Only**mandatorytraining**showsasignificantpreferencefor"StronglyAgree" (p=0.01).
- Otherattitudesareevenlysplitbetween" Agree “and"Stronglyagree."

2. Relationship Between Knowledge and Attitude Test: **Spearman’s Rank Correlation**

- **Null Hypothesis**: No correlation between composite knowledge and attitude scores.
- **Result**=0.15,p=0.54.
- **Conclusion**: No significant correlation (p>0.05).

Summary of Findings:

1. **H1 (Knowledge)**:

- Nurses have strong knowledge of IDA physiology and symptoms but lack expertise in **dietary management** and **cultural integration**.

2. **H2 (Attitude)**:

- Attitudes are universally positive, but only **mandatory training** shows a clear preference for "Strongly Agree." No significant link **exists between knowledge and attitude scoresDemographic Characteristics**

  - **Age**: Participants were relativelybalancedacrossagegroups: 29%(20–30years),25% (31–40 years), 21% (41–50 years), and 25% (51+ years).
  - **Gender**: Predominantly female (85%), with males underrepresented (15%).
  - **Education**: Majority held a Diploma (67%), followed by Bachelor’s (31%),and minimal Master’s qualifications (2%).
  - **Experience**: Early-career nurses (0–5years:31%)were most represented, followed by 11–15 years (27%), 16+ years (24%), and 6–10 years (18%).
  - **Training**: 51%hadpriorIDAtraining;49%lackedtraining.
  - **CulturalExperience**: 52%reportedexperiencewithculturallytailoredcare,while48% did not.

- **Knowledge Assessment**

  - **Strengths**:
    - **Physiological Causes**: 51%stronglyagreedtheyunderstoodIDA’s causes.
    - **SymptomIdentification**:52 %strongly agreed they could identify key symptoms.
  - **Critical Gaps**:
    - **Dietary Knowledge**: 64%(37%stronglydisagreed+27%disagreed)lacked familiarity with heme/non-heme iron sources.

Journal of Medical & Health Sciences Review
VOL-2, ISSUE-1, 2025
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https://jmhsr.com/index.php/jmhsr

- **Cultural Awareness**: 68%(28%stronglydisagreed+40%disagreed)were unaware of cultural dietary habits affecting iron intake.
- **Absorption Education**:66%(32%stronglydisagreed+34%disagreed)were unsure how to educate patients on enhancing iron absorption.
- **Integrative Care**: 67%undervaluedcombiningdietarycounselingwith pharmacological treatments.

- **Statistical Significance**:
- **Chi-square tests** confirmed significant skews in knowledge responses (p<0.001).While knowledge of physiology and symptoms was strong, gaps in dietary, cultural, and integrative care were pronounced.

- **AttitudesAssessment**
- **Universal Agreement**:
- **IDA's Importance**: 100%agreed/strongly agreed managing IDA is critical.
- **Cultural Tailoring**: 100%agreedculturallytailoredcounselingimproves outcomes.
- **Mandatory Training**: 100%supported mandatory anemia training (62%strongly agreed).

- **Confidence in Practice**:
- 100%feltconfidentprovidingdietarycounseling, despite gaps in dietary knowledge.
- 77%linkednursingcare quality directly to patient outcomes.

- **Mixed Opinions**:
- Only**mandatorytraining**showedasignificantpreferencefor"StronglyAgree" (p = 0.01).
- 60%believedimprovedtrainingenhancesdietary adherence, but 40%disagreed.

- **Relationship between Knowledge and Attitudes**
- **Spearman's Correlation** revealed **no significant link** (ρ=0.15,p=0.54)between composite knowledge and attitude scores.
- **Implication**: Positive attitudes (e.g., valuing cultural competence)did not correlate with actual knowledge levels, suggesting overconfidence or misaligned training.

- **Limitations of the Study**
- **Gender Imbalance**:
- The study sample was predominantly female (85%), with only 15% male participants. This gender imbalance may limit the generalize ability off in dings to male healthcare providers or mixed-gender populations.

- **Educational Bias**:
- The majority of participants held a Diploma (67%),with minimal representation of Master's degree holders (2%). This educational bias may skew results, as advanced education could influence knowledge, attitudes, and


Journal of Medical & Health Sciences Review
VOL-2, ISSUE-1, 2025
Online ISSN: 3007-309X Print ISSN: 3007-3081
https://jmhsr.com/index.php/jmhsr


practices differently.

Single-Hospital Setting:

- The study was conducted at a single tertiary care hospital in Lahore, which limits the generlizablity off in dings to other health care settings, such a rural clinics or community health centers.

- **Convenience Sampling**:
- Theuseofconveniencesamplingmayintroduceselectionbias, asparticipants were selected based on availability and willingness to participate, rather than random selection. This could affect the representativeness of the sample.

- **Self-Reported Data**:
- Therelianceonself-reportedquestionnairesforassessingknowledge, attitudes, and practices may lead to response bias, such as over reporting confidence or underreporting knowledge gaps.

- **Cross-Sectional Design**:
- The cross-sectional nature of the study limits the ability to establish causal relationships between variables (e.g., training and knowledge). Longitudinal studieswouldprovidemorerobustinsightsintohowtrainingimpactspractice over time.

- **Limited Cultural Diversity**:
- The study focused on a single geographic location (Lahore), which may not capturethefullspectrumofculturaldiversityindietaryhabitsandhealthcare practices across different regions or countries.

- **Lack of Patient Outcome Data**:
- The study primarily assessed nurses' knowledge, attitudes, and practices but did not directly measure patient outcomes (e.g., hemoglobin levels, adherence to treatment).Includingpatient-leveldatawouldstrengthenthestudy'sconclusions about the impact of nursing practices on IDA management.
- **Recommendations**

- **Enhance Training Programs**:
- Develop and implement **mandatory training programs** on iron deficiency anemia (IDA) management, focusing on dietary education, cultural competence, and integrative care strategies. This aligns with the strong support (62%strongly agreed) for mandatory training among participants.


Journal of Medical & Health Sciences Review
VOL-2, ISSUE-1, 2025
Online ISSN: 3007-309X Print ISSN: 3007-3081
https://jmhsr.com/index.php/jmhsr


- **Address Knowledge Gaps**:

- Provide targeted education on **dietary sources of iron** (heme and non- heme), **factors enhancing iron absorption**, and **cultural dietary habits** to address the significant gaps identified in the study.
- **Promote Cultural Competence**:
- Integrate **cultural competence training** into nursing curricula and continuing educationprogramstoimprovenurses'abilitytodeliverculturallytailoredcare, which was universally valued by participants.
- **Encourage Interdisciplinary Collaboration**:
- Foster collaboration between nurses, dietitians, and physicians to ensure **holistic approach** to IDA management, combining dietary counseling with pharmacological treatments.
- **Expand Research Scope**:
- Conduct**multi-centerstudies**acrossdiversegeographicandculturalsettingsto improves the generlizablity of findings and captures a broader range of dietary practices and healthcare challenges.
- **Incorporate Patient Outcome Metrics**:
- Future studies should include **patient-level data** (e.g., hemoglobin levels, treatment adherence) to directly assess the impact to fnursing practices on IDA outcomes.
- **Improve Sampling Methods**:
- Use**randomsamplingtechniques**infutureresearchtoreduceselectionbiasand ensure a more representative sample of nurses across different demographics and experience levels.
- **Focus on Gender Diversity**:
- Encourage greater participation of **male nurses** in studies to explore potential gender-based differences in knowledge, attitudes, and practices related to IDA management.
- **Leverage Technology**:
- Utilize **telehealth platforms** and **electronic health records(EHRs)**to enhance IDA management, particularly in underserved areas, by enabling remote monitoring and counseling.


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https://jmhsr.com/index.php/jmhsr


- **Policy Advocacy**:
  - Advocate for **policy changes** to standardize IDA management protocols and ensure that nurses receive ongoing professional development opportunities, supported by the study's findings on the importance of training.

Discussions

The findings of this study illuminate critical aspects of nurses' knowledge, attitudes, and practices (KAP) in managing iron deficiency anemia (IDA) within a tertiary care setting. While nurses demonstrated strengths in foundational medical knowledge and positive attitudes toward culturally tailored care, significant gaps in dietary education and cultural competence underscore the need for targeted training and policy reforms. These results align with global literature on IDA management while highlighting unique challenges in integrating evidence-based practices into nursing care.

Nurses exhibited strong understanding of Ida's physiological causes (51%stronglyagreed)and symptom identification (52% strongly agreed), reflecting foundational competency in path physiology. This aligns with Camaschella's (2015) assertion that nurses' training in hematology provides a robust basis for recognizing anemia's clinical manifestations. However, critical deficiencies emerged in dietary knowledge: 64%lacked familiarity with heme/non-heme iron sources, and 66%wereunsurehowto educate patient son enhancing iron absorption. These gaps mirror findings by Kumar et al. (2022), who noted that nurses often undervalue dietary interventions despite their centrality to IDA management. The disconnect between theoretical knowledge and practical dietary counseling skills suggests that current training programs may prioritize biomedical over nutritional education, a recurring issue in nursing curricula (O'Sullivan et al., 2023).

Cultural competence gaps further compounded these challenges.Astriking68%ofnurseslacked awareness of cultural dietary habits affecting iron intake, hindering personalized care for diverse populations. This finding resonates with Betancourt et al. (2016), who emphasized that cultural competence is critical for effective patient education but remains inconsistently integrated into healthcare training. Thestudy'sresultsunderscoretheurgentneedtobridgethisgap, particularly in multicultural settings like Lahore, where dietary practices vary widely across communities.

Despite knowledge gaps, nurses universally valued IDA management as a critical aspect of care (100% agreed/strongly agreed) and supported mandatory training (62% strongly agreed). This enthusiasm aligns with global calls for enhanced professional development in anemia management (WHO, 2024). However, a paradox emerged: 100% expressed confidence in providing dietary counseling, even as most lacked practical dietary knowledge.


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VOL-2, ISSUE-1, 2025
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https://jmhsr.com/index.php/jmhsr


This Overconfidence may reflected is alignment between self-perceived competence and actual skills, a phenomenon observed in healthcare education where confidence often precedes competency (Dunningetal.,2003).Suchdiscrepancieshighlighttheneedforcompetency-based assessments to ensure knowledge translates into practice.

Notably, 77% linked nursing care quality directly to patient outcomes, emphasizing nurses' recognition of their role in IDA management. Yet, only 60%believedimprovedtrainingwould enhance dietary adherence, revealing skepticism about the practicality of education programs. This ambivalence suggests that while nurses value training, they may doubt its real-world applicability—a barrier previously identified in low-resource settings (Mwangi et al., 2017).

The universal endorsement of culturally tailored counseling (100% agreed/strongly agreed) aligns with evidence that culturally sensitive care improves patient adherence and satisfaction (Betancourtetal., 2016).However,only52%hadexperiencedeliveringsuchcare,indicatinga gap between attitude and practice. This disconnect may stem from insufficient training opportunities or institutional support, as noted in studies from similar contexts (Alquaiz et al., 2013).

Similarly, while 56% strongly agreed that combining dietary and pharmacological treatments is vital,67%under valued this integration in practice. Fragmented care approached persist globally, of tenduetosiloed training and lack of inter disciplinary collaboration (Auerbach & Deloughery, 2016). Strengthening partnerships between nurses, dietitians, and physicians could mitigate this issue, fostering holistic IDA management. The study's limitations include its single-hospital design, which limits generalizability, and a gender-imbalanced sample (85% female), potentially skewing perspectives. Additionally, reliance on self-reported data risks response bias, and the cross-sectional design preclude escausal inferences. Future research should adopt longitudinal, multi-center designs with randomized sampling to capture diverse demographics and track training impacts over time. Incorporating patient outcome metrics (e.g., hemoglobin levels) would further validate findings.

The results advocate for mandatory training programs addressing dietary education, cultural competence, and integrative care. Institutions should leverage nurses 'strong motivation (50% strongly agreed to learn cultural influences) by embedding cultural competency modules into Continuing education. Policymakers must standardize IDA protocols, ensuring alignment with global guidelines (WHO, 2024), while hospitals should foster interdisciplinary collaboration to bridge the theory-practice divide. This study underscores nurses 'pivotal yet under-optimized role in IDA management in Lahore, Punjab, Pakistan. While their foundational knowledge and positive attitudes provide a strong foundation, systemic gaps in dietary and cultural education hinder holistic care. By addressing these gaps through targeted training, policy reforms, and interdisciplinary collaboration, healthcare

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https://jmhsr.com/index.php/jmhsr

systems can empower nurses to deliver equitable, evidence-based care, ultimately improving outcomes for the 1.2 billion individuals affected by IDAworldwide (Camaschella, 2015

Conclusion

The study emphasize nurses' essential role in treating iron deficiency anemia cases by demonstrating their educational shortcomings and cultural competence deficits. Nurses demonstrate adequate knowledge about IDA pathophysiology alongside positive patient-centered attitudes yet they remain ineffective at implementing dietary advice and culturally appropriate interventions. A gap exists between nurses' self-assessed competency levels and their true abilities so proper competency assessments and training programs become necessary. The nurses understand the vital need for collaborative care between different healthcare providers as well as cultural sensitivity yet experience difficulties in putting these approaches into practice because of insufficient training opportunities. The needed solution includes uniform training programs together with institutional backing and policy transformations that will create evidence-based patient-focused care. Verified integration between nurses and physicians and dietitians will enhance IDA management practices.

The study pursuing IDA management should use multi-center long-term patient outcome measurements to assess workforce training methods. Improved patient results become possible with healthcare systems that provide nurses essential IDA management know-how and practice execution capabilities.

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