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How Do Saudi Medical Practitioners Perceive Iron Deficiency Anemia?

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Abstract— Introduction: Awareness about variations in response to treatments and diagnostic cut-off values for iron deficiency anemia (IDA) in special patient populationsis crucial. This study aims to determine the knowledge level about IDA diagnosis and management. **Method:** This is a cross-sectional study in Saudi Arabia, using an online questionnaire distributed to family and internal medicine physicians. **Results:** Among 76 participants, 28.9 % diagnose IDA based on either iron study or complete blood count separately. Around half of the participants are aware of ferritin cut-off values to diagnose IDA among the general population during pregnancy, while only one-third are aware of values in-patient with heart failure and chronic kidney disease. Further, 57.9% of participants' diagnoses based on a local reference range rather than international cut-off values. Additionally, 17.1% would assess response to treatment within 2 to 6 weeks of treatment while the remaining either evaluate after three months or do not follow up at all. Similarly, only 77.6% perform work up to establish the underlying cause of IDA. **Conclusion:** IDA is a common health issue though knowledge about diagnosis and management is suboptimal. This is likely attributed to the misperception that diagnostic values and treatment responses are universal among different patients.

Keywords: Iron deficiency anemia; Chronic Kidney disease; Internal Medicine, Family Medicine

1. Introduction:

Iron deficiency anemia (IDA) is a global health issue, and it accounts for approximately half of the anemia cases estimated to be 1.2 billion individuals worldwide(1).Locally, the prevalence of IDA is estimated to be 35% of the Saudi population (2).

Iron deficiency anemia has several medical and social impacts in the form of a decline in adults' quality of life, especially for women of the reproductive age,and a decrease in cognitive and physical performance. It may also result in adverse outcomes of pregnancy for both mothers and newborns. Additionally, IDA is considered a negative prognostic indicator, particularly in patients with heart failure and chronic kidney disease (CKD). It is associated with increased hospitalization rates and increased risk of mortality (3).

Poor nutrition and malabsorption are the most common causes of IDA. However, particular groups of healthy people at higher risk of IDA despite relatively stable total body iron stores.These include higher iron requirements as in menstruating women and pregnancy or others with increased iron loss due to frequent blood donations(4,5).On the other hand, several chronic

diseases are frequently associated with IDA, notably chronic kidney disease, heart failure, and inflammatory bowel disease(5,6).

There is insufficient evidence to support iron deficiency anemia screening in asymptomatic pregnant women and other high-risk groups; nevertheless,the common practice suggests routine screening for IDA. However, class I recommendations recommend screening patients with heart failure for IDA at the time of diagnosis and then twice yearly (7,8).

There is a wide variation in the clinical presentations of IDA ranges from being asymptomatic or having mild symptoms like fatigue and hair loss to severe like dyspnea and angina. This variation is generally attributed to the speed with which the underlying condition develops (9). While it is easy to diagnose IDA, the process can be more complicated when IDA exists in the context of disorders with a variable degree of inflammation, such as patients with atherosclerosis, chronic kidney disease, and cancer. The inflammatory cytokines influence iron metabolism resulting in reduced tissue iron availability(10).

Iron deficiency anemia diagnosis is confirmed by assessing hemoglobin level and iron study, including serum ferritin or transferrin saturation. Since inflammatory cytokines influence iron metabolism, the parameters' cut-off values to diagnose IDA for patients with comorbidity or inflammation are different from those without them. Additionally, isolated low serum iron does not confirm IDA diagnosis(4). So, serum ferritin of less than 30 μg/L and or Transferrin saturation <20 percent are diagnostic for iron deficiency (ID). However, a ferritin level of less than 100 μg/L is diagnostic for ID in patients with chronic disease and inflammation, including heart failure or chronic kidney disease, not on hemodialysis. In contrast, a level of less than 200 μg/L is diagnostic for those on hemodialysis[11,12].

Oral iron replacement with a total daily dose of 150-200 mg of elemental iron considered standard front-line therapy for iron-deficiency anemia for a minimum duration of three to six months to have a full correction of anemia(13).New evidence reveals that lower single daily doses and every-other-day dosing of iron can improve absorption and improve tolerability. Generally, the hemoglobin level is expected to rise by 0.1 g/dL per day after starting iron therapy or around 1-1.5 g/dL on day 14. Therefore, an increment by less than 1 g/dL considered a lack of response(14).

Intravenous iron is the preferred option for patients who are intolerant of or lack response to oral replacement and those with inflammatory bowel disease,post-bariatric surgery, and CKD patients on hemodialysis[15,16].

From clinical practice, we observe several pitfalls during the diagnosis and management of iron deficiency anemia. Therefore, we are conducting this study to determine the level of awareness and knowledge about the diagnosis and management of IDA among family and internal medicine physicians in Saudi Arabia.

2. Method:

This is a cross-sectional study conducted in Saudi Arabia via an online English self-designed questionnaire. A questionnaire was distributed to family and internal medicine physicians in Saudi Arabia. The questionnaire includes biographical data such as gender, year of residency and experience, and other questions to assess the level of awareness and knowledge about diagnosis and management of iron deficiency anemia in different patient populations.

Data collected and analyzed using the International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS). The descriptive analysis was done to show mean, median and mode values with Standard deviation (SD) for quantitative data. The categorical data analyzed,

and chi-square will use to assess any association among different variables. A sample size of 82 was calculated with an estimated marginal error of 0.05 and a confidence interval of 0.95.

3. Results:

Out of 120 distributed questionnaires, 76 responses were received. Forty-four participants were family physicians and the remaining 32 from the department of medicine. Demographics and characteristics are shown in table 1.

Regarding diagnosis, among 76 participants, 13(17.1%) and 9 (11.8%) do diagnose Iron deficiency anemia based on the iron study and CBC, respectively, whereas 53(69.7%) is based on a combination of CBC and iron study as well as clinical presentation. Fifty-nine (77.6%) and 40(52.6%) participants use serum ferritin and transferrin saturation respectively to diagnose IDA, whereas 27 (35.5%) used serum iron level only. Additionally, only 43 (56.6%) are aware of ferritin cut-off values to diagnose IDA among the general population, with family physicians being more aware compared with internal medicine (70.5% vs. 37.5%, P value=0.001). Conversely, only 23 (28.3%) are aware of ferritin cut-off value in patients with chronic kidney disease, with internal medicine being more knowledgeable than family physicians (43.8% vs. 11.4%, P value=0.001). Similarly, 51.3% and 28.9% of participants are aware of cut off value in pregnant women and patients with heart failure with no statistical significance between both groups (P value= 0.28) Figure 1. However, 57.9% of participants' diagnoses based on a local reference range rather than on international cut-off values.

Only 13 (17.1%) of participants would assess response to therapy within 2 to 6 weeks of treatment regarding treatment. Conversely, 44 (57.9%) and 19 (25%) would consider assessment after three months or do not arrange to follow up, respectively. Similarly, only 59 (77.6%) would perform further work to establish the IDA's underlying cause. Further, 84.2% of participants knowthat iron supplement ingestion with Vitamin C enhances iron absorption with the significant statistical difference between both groups (86.4 vs. 81.3, P-value 0.54). However, only 28 (36.8%) are aware that iron supplements associated with increased absorption compared to daily ingestion with internal medicine are more consciousthan family physicians (56.3% vs. 22.7%, P-value 0.003). Similarly, only 22 (28.9%) would advise iron ingestion on an empty stomach to enhance absorption. Lastly, there is a strong correlation between years of experience and knowledge about IDA diagnosis and management (P-value 0.004). Additionally, we found that physicians' ability improves as they progress in the residency program but with no significant statistical difference (P-value 0.104). Similarly, there was no significant statistical difference in the knowledge level between board-certified and non-board-certified physicians (P-value 0.159).

4. Discussion:

Iron deficiency anemia is a common health problem frequently encountered in clinical practice, particularly by family physicians and internists(17).To our knowledge, this is the first local study and second internationallyassessing level of expertise and common pitfalls about IDA diagnosis and management among health care providers.

The IDA diagnosis is always made based on a combination of CBC and iron studies and clinical picture(11). However, our study showed that around one-third of participants' diagnoses were based only on either CBC or iron study separately. Diagnosis based on iron study only may result in mislabeling of all iron deficiency as IDA. Similarly, diagnosis based on CBC may result in over or unnecessary treatment since mimickers for IDA have similar presentations, such as anemia of chronic disease, alpha, and beta-thalassemia[18].

Transferrin saturation and ferritin are tests of choice to diagnose iron-deficiency anemia. Diagnosis of IDA is very challenging with the coexistence of inflammatory condition or chronic

disease. Therefore, the cut-off values for diagnosis in general populations and pregnant women are different from those with acute inflammation or chronic diseases such as heart failure or chronic kidney disease(13).Even though, majority of IDA's diagnoses were based on the lab reference range instead of on international cut off values. Further, around 35% of participants' IDA diagnoses were based on isolated low serum iron levels rather than serum ferritin or transferrin saturation. Additionally, approximately half of the participants are not aware of ferritin cut-off values to diagnose IDA in the general population and pregnancy. Moreover, only around 30 % of participants are knowledgeable about these cut off values in patients with heart failure and non-hemodialysis CKD patients. There is a discrepancy in knowledge between family and internal medicine physicians regarding IDA'S diagnosis. This discrepancy between the two groups of participants was more pronounced concerning one group of patients than the other. For illustration, family physician knowledge about IDA'S diagnosis in pregnancy is better than internal medicine. This discrepancy and variation are probably attributed to the kind of patients frequently met in each subspecialty.

Treatment of IDA has a huge impact on patient quality of life and the outcome of several diseases. Oral iron supplementation is considered an effective unexpansive front-line therapy. However, several factors enhance iron absorption, including iron ingestion on an empty stomach and vitamin C supplements. Additionally, accumulative evidence shows that oral iron ingestion on alternate days than a single daily dose decreases serum hepcidin and enhances iron absorption(16,18).We found that around 72% of participants would manage IDA with diet only without iron supplementation of any form. Only 28.9% would advise iron ingestion on an empty stomach to enhance absorption. Moreover, only one third are aware that every other day iron supplement is associated with enhanced absorption compared to daily ingestion, with the internist being more aware than family physicians.

Response assessment for oral supplements is crucial. It determines tolerability and refractoriness to initial treatment. The assessment is ideally done between 2 to 8 weeks of treatment(15,19).IDA is not a disease by itself but rather an indication of an underlying disease. Therefore, exploring the underlying causeis an important aspect of management to increase iron availability and reduce demand[16].Nevertheless, our studies show that only 17% of participants would assess response within 2-6 weeks of treatment initiation. In contrast, the rest either would followthree months or do not follow them at all. Moreover, around one third would not perform further workups looking for the underlying cause of IDA.

Interestingly, we found that the knowledge level is directly proportional to the number of years of experience, regardless of the training level. Similarly, the level of knowledge improved with the advancement in training but no significant statistical difference.

Lastly, our study attempted to address IDA awareness and knowledge among physicians from two different subspecialties that commonly confront patients with IDA though it has some limitations(17).First, it is of small number, which might not represent the whole physicians' populations and hamper subgroup analysis. Second, we are unsure whether one diagnostic tool is not done because of unavailability or purely due to a lack of knowledge. Therefore, extensive studies are needed to ascertain these findings and challenges physicians faceto reach an accurate diagnosis and optimal management.

5.Conclusion:

Despitethe availability of several diagnostic tools and therapeutic paradigm,physicians' knowledge about IDA diagnosis and management is suboptimal. The most plausible explanation is that variations in cut-off values for diagnosis and degrees of response to a different form of treatment from one group of patients to another render the process of diagnosis and management more complex and challenging. Therefore, raising awareness that several circumstances havea

significant influence on IDA diagnosis and management help physician to be more mindful during lab values interpretation, proper selection of a specific form of iron and avoidance of unnecessary treatment.

6. Acknowledgment: Thanks to all participants for their collaborations and agreement to fill the questionnaire.

7. Statement of Ethics: The approval was taken from the Ethical Committee in King Fahad medical city in Riyadh. Participants were explained the purpose of the study, the benefits of doing this research, the confidentiality and anonymity of the data.

8. Conflict of interest: No conflict of interest to disclose.

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Variable	Subject
Gender	Male 36 (47.4%)
	Female 40 (52.6%)
Specialty	Family medicine 44 (57.9%)
	Internal Medicine 32 (42.1%)
Level of training	Board certified 23 (30.3%)
	Year 1 14 (18.4%)
	Year 2 07(9.2%)
	Year 3 10 (13.2%)
	Year 4 11 (14.5%)
	Not in program 11 (14.5%)
Exposure to IDA cases	Participant previously diagnosed with IDA 24 (31.6 %)
	Participant's relative with IDA 46 (60.5%)
	Participant managed IDA 66 (86.8 %)

Table1. Participants Demographics and characteristics

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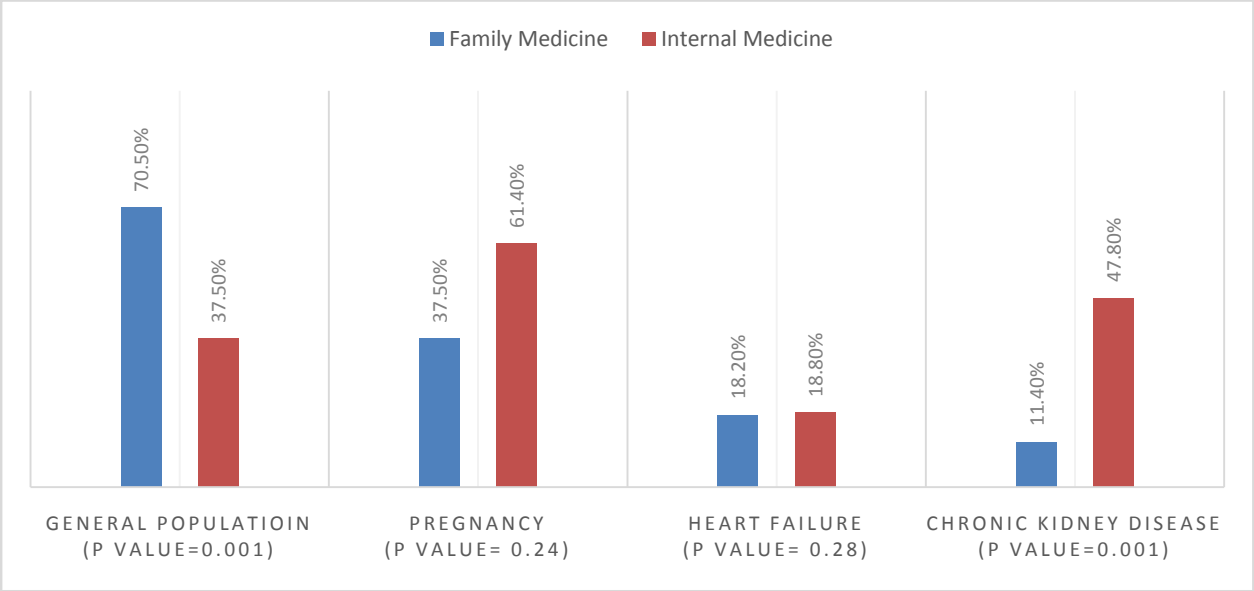

Figure legend:

Fig. 1. Comparison between Family and Internal Medicine Physicians' Awareness of Ferritin Diagnostic Cutoff Values among Different Patient Populations