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RESEARCH ARTICLE

COMPLIANCE TO IRON SUPPLEMENTATION AMONG PREGNANT WOMEN WITH IRON DEFICIENCY ANEMIA IN RIYADH, SAUDI ARABIA: DETERMINANTS AND BARRIERS

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Abstract

Background: iron deficiency anemia among mothers is a serious public health issue. Studies found a link between adverse events and iron supplementation compliance during pregnancy.

Objectives: to assess the compliance to iron supplementation among pregnant women with iron deficiency anemia in Riyadh, Saudi Arabia, and its determinants and barriers.

Methods: a cross-sectional study was done in Riyadh, Saudi Arabia on pregnant women with iron deficiency anemia who attended primary health care centers (PHCCs) in Riyadh, Saudi Arabia. An online questionnaire was used to collect data about women's demographics, obstetric and gynecological history, prescribed iron supplements, women's awareness regarding iron deficiency anemia, compliance with iron/folate supplementation, and reasons for non-compliance.

Results: 74.8% of females sometimes forget to take iron supplements, 54.1% reduced or stopped taking iron supplements without telling their doctor because they felt worse when taking them, and 63.5% sometimes forget to bring or take iron supplements when they leave home. The prevalence of low, medium and high compliance with iron supplement intake was 74.2%, 15.1%, and 10.7%, respectively, among the participants. Side effects (43.4%) and forgetting (32.1%) were the most common reasons for non-compliance. High compliance was significantly higher among participants over the age of 30, with a university education or higher, in the trimester, who had ≥ 5 antenatal visits, and who preferred iron supplements in tablet form.

Conclusion: The low observed compliance among studied females emphasizes the importance of increasing communication for behavior change and counseling before or during antenatal care to improve adherence.

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Introduction:-

Anemia is one of the most common nutritional deficiency conditions, especially among pregnant women in impoverished nations[1,2]. Anemia is a major global public health issue that primarily affects children and pregnant women[3]. According to WHO, 42% of children under the age of five and 40% of pregnant women globally are

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anemic. According to the World Health Organization, 58% of pregnant women in underdeveloped nations are anemic[4].

Mothers' anemia, particularly iron deficiency anemia, is one of the most serious public health issues in the Arab Gulf region, with prevalence ranging from 22.6% to 54.0%[5,6,7]. Anemia during pregnancy is described as having a Hb level of less than 11.0 g/dl throughout pregnancy and less than 10.0 g/dl after delivery.

The WHO (WHO 1972). The recommendations of the US Centers for Disease Control (CDC 1989) take into account the observation that there is a trough in the physiological course of Hb during pregnancy. According to this definition, anemia is present if the Hb level is less than 11 g/dl during weeks 1–12 (first trimester) and 29–40 (third trimester) of gestation, and less than 10.5 g/dl during weeks 13–28 (second trimester), Anemia as well is significantly related to poor pregnancy outcome with life-threatening complications for both mother and fetus[8,9].

WHO reported that daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400 µg (0.4 mg) folic acid is recommended for pregnant women to prevent maternal anemia, puerperal sepsis, low birth weight, and preterm birth [10] on the other hand, evidence about fruitful effects of iron supplementation during pregnancy on functional outcomes is questionable. Furthermore, the theoretical possibility of adverse effects, such as oxidative damage, with the administration of iron supplements during pregnancy has been raised[11]. Worldwide, research conducted in many countries revealed that one of the main causes behind the inefficacy of iron supplementation during pregnancy programs was low compliance of women in taking the prescribed daily iron dose. Poor adherence has been associated with many factors, including gastrointestinal side effects that can occur with taking iron, inadequate supply of tablets, inadequate health education of patients by healthcare staff about the utilization of tablets and possible transient side-effects, inadequate use of prenatal health-care services, poor knowledge and/or patient doubts regarding the tablets besides community attitudes and practices that affect women's perception regarding iron supplements efficacy [2,13,14].

Therefore, measuring compliance with iron supplementation is important, as iron supplementation is most effective when taken regularly for relatively prolonged periods. Many studies assessed a significant association between adverse events and compliance with iron supplementation during pregnancy[12,15]. Assessing pregnant women's adherence to iron supplementation, and causes of non-adherence will help to map the challenges and obstacles facing the females with the development of appropriate health education programs and services to overcome adherence barriers .

This study aimed to assess compliance to iron supplementation among pregnant women with iron deficiency anemia in Riyadh, Saudi Arabia, and its determinants and barriers.

Subjects And Methods:-

Study design, setting, and time frame:

A questionnaire-based descriptive cross-sectional study was done in primary health care centers (PHCCs) in cluster one in Riyadh, Saudi Arabia from Oct 2021 to April 2022.

Study population:

The study targeted all pregnant women with iron deficiency anemia who attended primary health care centers (PHCCs) in Riyadh, Saudi Arabia, and agreed to participate in this study. The inclusion criteria were pregnant women with iron deficiency anemia HB less than 11.0 g/dl attending the study settings and receiving prescriptions for iron supplementation, aged 18 years or more, and agreeing to participate in the study. The exclusion criteria were non-pregnant women, nonanemic pregnant women, not formally consent to participate and those having any type of anemia other than iron deficiency anemia such as b12 deficiency anemia, folate deficiency anemia, thalassemia sickle cell and G6PD anemias.

Sample size and sampling technique:

A sample of 307 pregnant women with iron deficiency was required based on literature with an estimated average compliance rate for prescribed iron supplements of 45% (16-18) with a precision of 5% at a 95% confidence level and design effect =1. The sample size was calculated using PASS software for study sample and study power estimation.

Data collection: an online questionnaire was constructed by researchers based on an intensive literature review of relevant articles, reports, and experts' consultations. The data of this study were collected from pregnant women who attended primary health care centers (PHCCs) in Riyadh, Saudi Arabia by filling out the questionnaire. The questionnaire data included demographic characteristics, obstetric and gynecological history, prescribed iron supplements, types, women's awareness regarding iron deficiency anemia, compliance with iron/folate supplementation, and reasons for non-compliance.

Assessment of compliance depends on the participants' questionnaire responses about their use of iron supplementation during pregnancy. Supplementation compliance was divided into one of three categories: (1) strictly compliant, (2) partially compliant, and (3) non-compliant. Assessment of compliance was measured by using the 8-item Morisky Medication Adherence Scale (MMAS-8). Each item on the scale is graded 0 or 1. The sum score ranges from 0 to 8 and is categorized into low (sum score < 6), medium (sum score 6 < 8), and high (sum score 8) compliance [16,17,18].

Ethical Considerations:

ethical approval for this study was obtained from the ethics review committee at King Saud medical city. The confidentiality of the anonymously collected data was maintained all the time. All data was stored in a secure and safe place that was only accessible by the researcher. Informed consent was distributed with a questionnaire to all participants.

Data Analysis:

Data were statistically analyzed using the (SPSS) program version 26. To assess the association between the variables, the Chi-squared test (χ^2) was applied to qualitative data that were expressed as numbers and percentages. Statistical significance was defined as a p-value of less than 0.05.

Results:-

(Table 1) shows that 48.4% of studied females had an age > 30 years, 95% had a Saudi nationality, 97.5% were married and 54.7% had a university level of education or above. Of them, 61.6% were housewives and 39.6% had a monthly income >10000 SR.

(Table 2) shows that 62.9% of studied females were in their 2nd or more pregnancies and 41.2% were in the last three months (the 7th, 8th, or 9th month) of pregnancy. About 42% (42.1%) had ≥ 5 visits to the pregnancy follow-up clinic, 78.6% had knowledge about borderline deficiency anemia and 91.2% had knowledge about iron supplements. Of the participants, 93.1% were taking iron supplements, of them, 83.8% were taking it as tablets and 72.3% preferred it in tablet form.

As for the pattern of iron supplement intake among studied females, (Table 3) shows that 74.8% sometimes forget to take an iron supplement and 73% reported that there is a dose that they did not take. Of them, 54.1% reduced or stopped taking iron supplements without telling their doctor, because they felt worse when taking them. Most females (63.5%) sometimes forget to bring or take iron supplements when they leave home and 71.7% took iron supplements yesterday. More than half (52.2%) sometimes stop taking iron supplements when they feel their health condition is under control. About 50% (50.3%) felt upset because they strictly followed their treatment plan. (34.6% found it difficult to remember to take an iron supplement from time to time, while 9.4% usually do.

(Figure 1) shows that the prevalence of low, medium and high compliance with iron supplement intake among the participants was 74.2%, 15.1%, and 10.7% respectively.

The most common reasons for non-compliance in taking iron supplements were side effects (constipation - nausea - vomiting - stomach discomfort - loss of appetite - diarrhea) (43.4%) and forgetting (32.1%) (Figure 2).

(Table 4) shows that high compliance with iron supplement intake was significantly higher among participants with an age > 30 years old and among those with a university level of education and above and among housewives ($p < 0.05$).

(Table 5) shows that high compliance with iron supplement intake was significantly higher among participants in the last three months (the 7th, 8th, or 9th month) of pregnancy, who had ≥ 5 visits to the pregnancy follow-up clinic, who take iron supplements, who take it as tablets and who preferred iron supplements in the tablets form ($p < 0.05$).

Discussion:-

This study aimed to assess compliance to iron supplementation among pregnant women with iron deficiency anemia in Riyadh, Saudi Arabia, and its determinants and barriers.

Assessment of compliance depends on the participants' questionnaire responses about their use of iron supplementation during pregnancy. Supplementation compliance was divided into one of three categories: (1) strictly compliant, (2) partially compliant, and (3) non-compliant [16,17,18,19].

In our study, we assessed pregnant women's adherence to iron supplementation and the causes of non-adherence. The World Health Organization recommends the intake of daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400 μg (0.4 mg) of folic acid for pregnant women to prevent maternal anemia, puerperal sepsis, low birth weight, and preterm birth [20].

We evaluated the rate of compliance with prenatal Iron supplementations and investigated the factors associated with compliance with Iron supplementation during pregnancy. As seen from the above results the prevalence of compliance with iron supplement intake among the participants was 10.7% (Figure 1). Our results were lower than the 16.4% reported in a study carried out in the Yaounde gynaeco-obstetric and pediatric hospital [21]. Both results were lower than 20.4% of the study's results in the Mecha district, Western Amhara [22].

The questionnaire in this study sought information on the age group with the highest compliance and we found that high compliance with iron supplement intake was significantly higher among participants with an age > 30 years old similar to the finding in a study conducted in India which revealed that elderly and middle-aged women were slightly more compliant than younger women, and another study in Western Amhara which showed a higher compliance rate in elderly women [23,24].

Our findings show high compliance with iron supplement intake was significantly higher among those with a university level of education. Which is similar to the study done in Hebron city [25]. And similar to our study, as well as other studies conducted in Hebron city and by Getachew M. et. al, having 4 visits or more to antenatal care (ANC) clinics was positively associated with adherence [26].

The most common reasons for non-compliance in taking iron supplements in our study were side effects (constipation - nausea - vomiting - stomach discomfort - loss of appetite - diarrhea) (43.4%) and forgetting the dose (32.1%). These results matched results from the Gebremedhin study [27] and Soraya Siabani et. al. study [28] and a study done in Hebron city [26].

We found a significant association between side effects and adherence to iron supplementation during pregnancy. In addition, high compliance with iron supplement intake was significantly higher among participants with an age > 30 years old and among those with a university level of education and above, those in the last three months of pregnancy, who had ≥ 5 visits to the pregnancy follow-up clinic, who take iron supplements, who take it as tablets and who preferred iron supplements in the tablets form. The same result was revealed in previous studies [20,25]. Thus, it will be necessary to counsel the women that these side effects are generally transient and not harmful, as well as the early intervention of physicians and health professionals regarding the use of iron supplements may increase adherence to prescription among pregnant women and prevent iron deficiency anemia. The improvement in the education of the people, in the long run, is known to raise psychological tolerance to side effects [29].

Limitations

The use of a self-reporting questionnaire in the present study could have a recall bias.

Conclusion:-

This study found that 74.8% of studied females sometimes forget to take an iron supplement, 54.1% reduced or stopped taking iron supplements without telling their doctor because they felt worse when taking them and 63.5% sometimes forget to bring or take iron supplements when they or leave home. The prevalence of low, medium and high compliance with iron supplement intake among the participants was 74.2%, 15.1%, and 10.7% respectively. The most common reasons for non-compliance were side effects (43.4%) and forgetting (32.1%). High compliance with iron supplement intake was significantly higher among participants with an age > 30 years, among those with university education and above, among participants in the last three months of the trimester, who had ≥ 5 visits to the pregnancy follow-up clinic, and who preferred iron supplements in the tablets form. The low observed compliance among studied females emphasizes the critical importance to increase communication for behavior change and counseling before or during antenatal care to improve adherence. Caring physicians should be aware of the non-adherence problem and the factors influencing adherence, and they should try to improve pregnant women's adherence to iron supplement intake.

Table 1:- Distribution of studied females according to their demographic data (No.:318).

Variable	No. (%)
Age (years)	
<20	144 (45.3)
20-30	20 (6.3)
>30	154 (48.4)
Nationality	
Saudi	302 (95)
None-Saudi	16 (5)
Marital status	
Married	310 (97.5)
Divorced	8 (2.5)
Educational level	
Illiterate	10 (3.1)
Primary	14 (4.4)
Middle	14 (4.4)
Secondary	106 (33.3)
University and above	174 (54.7)
Employment	
Housewife	196 (61.6)
Employee in governmental sector	92 (28.9)
Employee in private sector	30 (9.4)
Monthly income (SR)	
<5000	82 (25.8)
5000-10000	110 (34.6)
>10000	126 (39.6)

Table 2:- Distribution of studied females according to their obstetric data, knowledge about anemia and iron supplements and types of taken preferred iron supplements (No.:318).

Variable	No. (%)
Number of pregnancies	
1 st	118 (37.1)
2 nd and more	200 (62.9)
Pregnancy duration	
The last three months (the 7 th , 8 th or 9 th month)	131 (41.2)
The first three months (1 st month – 2 nd – 3 rd month)	96 (30.2)
Second trimester (4 th , 5 th or 6 th month)	91 (28.6)
The number of visits to the pregnancy follow-up clinic	
<2	74 (23.3)
2-4	110 (34.6)
≥ 5	134 (42.1)

Do you have knowledge about borderline deficiency anemia? No Yes	68 (21.4) 250 (78.6)
Do you have knowledge about iron supplements? No Yes	28 (8.8) 290 (91.2)
Do you take iron supplements? No Yes	22 (6.9) 296 (93.1)
Type of iron supplement (No.:296) tablets intravenous iron Through iron-rich foods or supplements Transfusion	246 (83.8) 34 (11.4) 14 (4.7) 2 (0.6)
Type of preferred iron supplement tablets drink intravenously	230 (72.3) 18 (5.7) 70 (22)

Table 3:- Distribution of studied females according to pattern of iron supplements intake (No.:318).

Variable	No. (%)
Do you sometimes forget take iron supplement? No Yes	80 (25.2) 238 (74.8)
Some people sometimes forget to take iron supplements for reasons other than forgetting to think about your previous doses. Is there a dose that you did not take? No Yes	86 (27) 232 (73)
Have you ever reduced or stopped taking iron supplements without telling your doctor, because you felt worse when you took them? No Yes	146 (45.69) 172 (54.1)
When you travel or leave home, do you sometimes forget to bring or take iron supplements? No Yes	116 (36.5) 202 (63.5)
Did you take iron supplements yesterday? No Yes	90 (28.3) 228 (71.7)
When you feel that your health condition is under control, do you sometimes stop taking iron supplements? No Yes	152 (47.8) 166 (52.2)
Have you ever felt upset because you strictly followed your treatment plan? No Yes	158 (49.7) 160 (50.3)
How often do you find it difficult to remember to take an iron supplement? Never Rarely Sometimes From time to time Usually, all the time	46 (14.5) 66 (20.8) 66 (20.8) 110 (34.6) 30 (9.4)

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Figure 1:- Percentage distribution of the participants according to their compliance with iron supplement intake based on the MMAS-8 scores classification (No.:318).

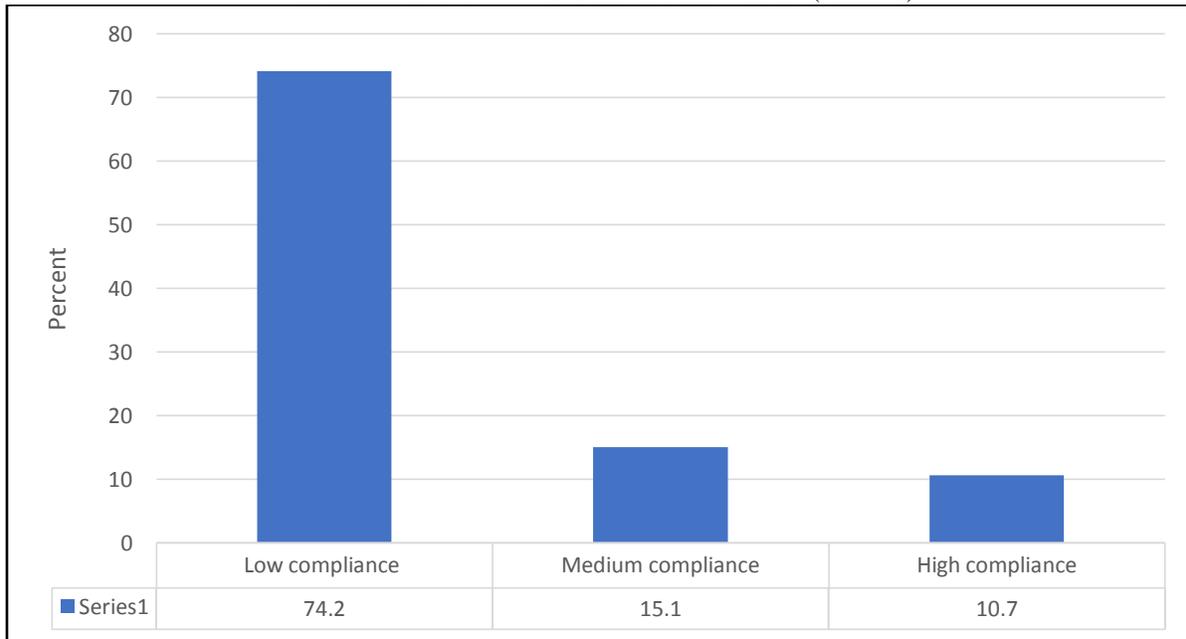


Figure 2:- Percentage distribution of the participants according to reasons for non-compliance in taking iron supplements.

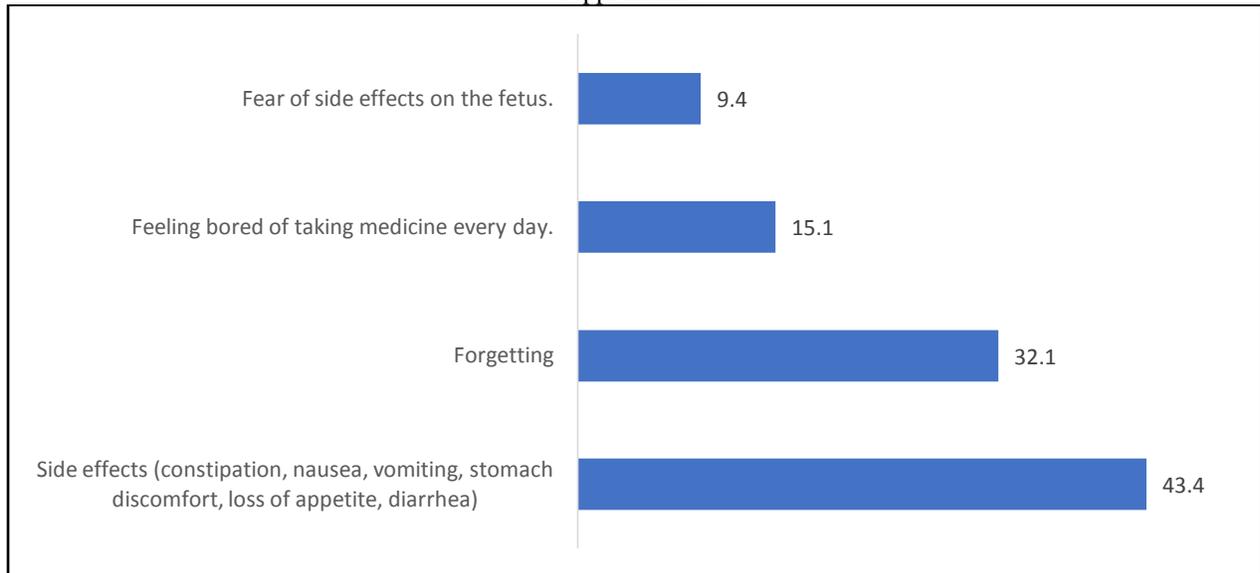


Table 4:- Relationship between compliance with iron supplement intake and participants' demographic data (No.:318).

Variable	Level of compliance with iron supplement intake			χ^2	p-value
	Low compliance No. (%)	Medium compliance No. (%)	High compliance no. (%)		
Age (years)					
<20	116 (49.2)	12 (25)	16 (47.1)	12.07	0.017
20-30	16 (6.8)	4 (8.3)	0 (0.0)		
>30	104 (44.1)	32 (66.7)	18 (52.9)		

Nationality					
Saudi	222 (94.1)	46 (95.8)	34 (100)	2.77	0.32
None-Saudi	14 (5.9)	2 (4.2)	0 (0.0)		
Marital status					
Married	228 (96.9)	48 (100)	34 (100)	2.85	0.24
Divorced	8 (3.4)	0 (0.0)	0 (0.0)		
Educational level					
Illiterate	4 (1.7)	0 (0.0)	6 (17.6)	46.41	<0.001
Primary	6 (2.5)	6 (12.5)	2 (5.9)		
Middle	14 (5.9)	0 (0.0)	0 (0.0)		
Secondary	78 (33.1)	22 (45.8)	6 (17.6)		
University and above	134 (56.8)	20 (41.7)	20 (58.8)		
Employment					
Housewife	146 (61.9)	28 (58.3)	22 (64.7)	8.5	0.075
Employee in governmental sector	62 (26.3)	18 (37.5)	12 (35.3)		
Employee in private sector	28 (11.9)	2 (4.2)	0 (0.0)		
Monthly income (SR)					
<5000	68 (28.8)	8 (16.7)	6 (17.6)	6.14	0.188
5000-10000	80 (33.9)	20 (41.7)	10 (29.4)		
>10000	88 (37.3)	20 (41.7)	18 (52.9)		

Table 5:- Relationship between compliance with iron supplement intake and participants' obstetric data, knowledge about anemia and iron supplements and types of taken and preferred iron supplements and reasons for non-compliance (No.:318).

Variable	Level of compliance with iron supplement intake			χ^2	p-value
	Low compliance No. (%)	Medium compliance No. (%)	High compliance no. (%)		
Number of pregnancies					
1 st	90 (38.1)	18 (37.5)	10 (29.4)	0.97	0.615
2 nd and more	146 (61.9)	30 (62.5)	24 (70.6)		
Pregnancy duration					
The first three months (1 st month –2 nd –3 rd month)	81 (34.3)	11 (22.9)	4 (11.8)	18.37	0.001
Second trimester (4 th , 5 th or 6 th month)	70 (29.7)	7 (7.7)	14 (41.2)		
The last three months (the 7 th , 8 th or 9 th month)	85 (36)	30 (62.5)	16 (47.1)		
The number of visits to the pregnancy follow-up clinic					
<2	61 (25.8)	11 (22.9)	2 (5.9)	14.6	0.006
2-4	87 (36.9)	9 (18.8)	14 (41.2)		
≥5	88 (7.3)	28 (20.9)	18 (52.9)		
Do you have knowledge about borderline deficiency anemia?					
No	48 (20.3)	14 (29.2)	6 (17.6)	2.16	0.339
yes	188 (79.7)	34 (70.8)	28 (82.4)		
Do you have knowledge about iron supplements?					
No	20 (8.5)	0 (0.0)	8 (23.5)	13.84	0.001
Yes	216 (91.5)	48 (100)	26 (76.5)		
Do you take iron supplements?					
No	22 (9.3)	0 (0.0)	0 (0.0)	8.21	0.016
Yes	214 (90.7)	48 (100)	34 (100)		
Type of iron supplement (No.:296)					

tablets	180 (76.3)	36 (75)	30 (88.2)	18.36	0.019
intravenous iron	24 (10.2)	6 (12.5)	4 (11.8)		
Through iron-rich foods or supplements	8 (3.4)	6 (12.5)	0 (0.0)		
Transfusion	2 (0.8)	0 (0.0)	0 (0.0)		
Type of preferred iron supplement				16.12	0.003
tablets	158 (66.9)	40 (83.3)	32 (94.1)		
drink	18 (7.6)	0 (0.0)	0 (0.0)		
intravenously	60 (25.4)	8 (16.7)	2 (5.9)		

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Conflicts of interest:

None declared.

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