



Research article

EVALUATION OF IRON SUPPLEMENT PRESCRIBING PRACTICES IN ANEMIC PATIENTS: A STUDY OF COMMUNITY PHARMACIES IN GANDHINAGAR DISTRICT

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Abstract

Background: Anemia and iron deficiency anemia (IDA) are major global health concerns, particularly in developing nations like India, largely due to inadequate dietary intake and impaired iron absorption.

Objective: This prospective, observational study aimed to evaluate prescribing patterns for iron supplements using WHO indicators and identify factors influencing supplement selection and side effect management.

Methods: Conducted over six months in four community pharmacies in Gandhinagar, Gujarat, the study followed 139 anemic patients. WHO prescribing indicators were applied, and data were analyzed using descriptive statistics.

Results: Most patients had mild to moderate anemia. Analysis of 350 prescribed drugs revealed an average of 2.5 drugs per prescription, indicating over-prescription. Only 2.5% of drugs were prescribed generically, showing poor adherence to WHO standards. Injectables comprised 9% of prescriptions, while orals were most common. Only 9% of drugs were from the national essential medicines list. Supplement choice (ferrous fumarate, ferrous ascorbate) correlated with patient age and sex. Three patients reported side effects: nausea (ferric carboxy maltose), dark stools and nausea (ferrous ascorbate), and constipation (ferrous fumarate).

Conclusion: While iron supplementation is common, the study highlights a significant need for improved adherence to WHO prescribing norms and more rational drug use practices in community pharmacy settings.

Keywords: Anemia, Iron Supplements, Community Pharmacy Services, Practice Patterns, Drug Prescriptions

Article Info: Received on 02/10/2025, Review Completed on 25/10/2025, Accepted on 19/11/2025



Cite this article as:

Mathuria A, Bhatt S, Soni A, Christian P. Evaluation of iron supplement prescribing practices in anemic patients: a study of community pharmacies in gandhinagar district. KSV Journal of Pharmacy and Health Sciences 2025;2(2):24-36

Available from:

[Volume 2, Issue 2 \[July 2025 to December 2025\] | KSV Journal of Pharmacy and Health Sciences](#)

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Introduction:

Anemia is a condition of blood disorder. The body doesn't obtain enough oxygen when hemoglobin or red blood cells are low. Consequently, fatigue or other symptoms are experienced [1]. The World Health Organization says that anemia is a serious global public health concern that mostly affects women, young children, teenage girls who are menstruating, and pregnant and postpartum women [2]. Anemia may occur from a number of diseases, disorders, and other situations. If the body is unable to satisfy its increased need for red blood cells during pregnancy, for example, anemia may result. Certain autoimmune diseases and other conditions can cause your body to create proteins that damage your red blood cells (RBCs), which can lead to anemia [1]. When the body loses too many red blood cells, severe internal or external bleeding—from injuries, for instance—can result in anemia. There are two types of anemia: acquired and genetic. The term "acquired" indicates that the condition develops over time compared to being innate. "Inherited" means that you inherited the condition from your parents. Iron-deficiency anemia, hemolytic anemia, aplastic anemia, and pernicious anemia are among the various forms of anemia. Numerous illnesses and ailments are linked to the various types of anemia [1]. Weakness, pale skin, light headedness, dyspnea, and irregular heartbeats are all signs of anemia.

The most common type of anemia is iron deficiency, which occurs when your body does not have enough iron [3]. It can be caused by blood loss, gastrointestinal diseases such as celiac disease (sprue), inflammatory bowel diseases, undergoing with gastric bypass operations, and diets without iron-rich foods [4][5]. Iron deficiency anemia can be diagnosed by blood tests that include a complete blood count (CBC), evaluating the levels of serum ferritin, iron, total ironbinding capacity, and/or transferrin. Laboratory abnormalities in patients with iron deficiency, low hemoglobin (Hb), low hematocrit (Hct), low ferritin, low serum iron (FE), high or low platelets, high transferrin, or total iron-binding capacity (TIBC), and low iron saturation. Small, oval-shaped cells having pale centers may be visible on the blood slide or peripheral smear [6][5].

The use of iron supplements in severity and type of anemia determine how it is treated. Oral therapy is the first course of treatment [4][7]. Ferrous fumarate (33% elemental iron), ferrous gluconate (12% elemental iron), and ferrous sulfate (20% elemental iron) are the most available and affordable oral iron replacement treatments for the general public [6]. Commonly used elements include ferrous sulfate, ferrous fumarate, ferric ammonium citrate, and ferrous ascorbate. Ferrous ascorbate has ferrous iron and ascorbate, which has good absorption because ascorbic acid enhances the iron absorption [8]. When a patient is unable to take oral medications or has gastrointestinal intolerance, parenteral iron is used. Because oral iron therapies have limited absorption, inadequate tolerability, and adverse effects, intravenous iron, either by itself or in

combination with erythropoietin therapy, is thought to be an alternative treatment option. Because it helps rapidly increase the iron concentration in the serum and reduces the need for blood transfusions, intravenous iron sucrose treatment is the best substitute for oral iron supplements in an emergency [4][7]. Common intravenous iron supplement used for treatment are Iron sucrose (200mg-500mg), Ferric carboxymaltose (750mg) and Ferric derisomaltose (20mg/kg) [9].

A prescription is a written format of list of drugs prescribed by a registered doctor and is dispensed by a pharmacist. Prescription pattern monitoring studies (PPMS) is drug utilization with the main focus on prescribing, dispensing and administering of drugs, the primary objective of PPMS is to support rational use of medications (RUM) [10]. They promote proper use of medications under supervision and reduce the use and misuse [11]. Most of these studies have shown that doctors use medications irrationally as a result of their inability to follow the guidelines set up by regulatory bodies. As a result, this raises the risk of treatment failure, antibiotic resistance, and the financial strain on both the patient and the community at large. Prescription audits can be conducted on a regular basis to evaluate the practitioners' ability to prescribe rationally [12]. The World Health Organization (WHO) provides guidelines that increase the responsible utilization of medicine in society and, in turn, promote responsible utilization of drugs in a medical facility. The prescription practice indicators assess how well medical professionals' issue in a number of crucial areas associated to the responsible use of medications. The indicators are based on the practices observed in a sample of clinical encounters at outpatient medical facilities for the treatment of acute or chronic disorders [15].

Community pharmacies are essential in helping people in the community receive pharmaceutical care services. Patients depend on community pharmacies for their drug needs [16]. These pharmacies are an essential component of the healthcare system since they are easily accessible and convenient for patients. Patients depend on local pharmacies for their prescription requirements, and the pharmacists working there are frequently the first people patients contact when they need guidance or information about their conditions and prescription drugs [16]. It encourages the use of immediate-release iron supplementation. Make use of folic acid and ascorbic acid combination therapy [13].

This study is about Evaluation of Iron Supplement Prescribing Practices in Anemic Patients at Community Pharmacies in Gandhinagar District. The objective of the study is to evaluate the prescribing patterns of iron supplements in anemic patients at community pharmacies in Gandhinagar district using WHO prescribing indicators, identify factors influencing the choice of iron supplements prescribed and to identify

and report side effects associated with the prescribed iron supplements.

Objective:

The goal of the prospective, observational trial was to assess the patterns of prescribing iron supplements based on the WHO indicators of prescribing and determine the factors that help in decision-making in selecting supplements and discussing possible side effects

Materials and methods:

Study design

Prospective, Observational Study

Study duration and Ethical approval

The study was carried out for six months from October 2024 to March 2025. Ethics committee approved the protocol in month of October, data collection was conducted for 4 months

Study population

The study was carried at different community pharmacies in Gandhinagar district. A total of 208,299 people inhabited Gandhinagar during the 2011 Indian census year. The male demographic comprises 53 percent of all people notwithstanding the 47 percent female population living in the area. The statistics show Gandhinagar has an average literacy level which amounts to 90 percent. The literacy achievement measured at 91 percent for male residents across Gandhinagar but female residents scored 89 percent reading ability. They represent 11 percent of the overall Gandhinagar population that is under six years old. From 208,299 individuals. The study included 139 patients from various locations within Gandhinagar district to determine community pharmacy practices of prescribing iron supplements to anemic patients according to their income levels and educational background.

Study sites

The study was carried out in four community pharmacies within Gandhinagar:

1. Geeta Chemist
145/1, Anandvatika, Near Panchdev Temple, Sector-22, Gandhinagar, 382021.
2. P. Manubhai Medical Stores
Sector 21, near lakshmi bakery, c-5 shopping center, Gandhinagar, Gujarat 382021.
3. Umiya Medical
167, near Darshan Shah Hospital, Sector 21, Gandhinagar, Gujarat 382021.
4. Namo'stuTe Pharmacy:
Plot No-1285, Sector-6 D, Near, GH 3 Circle, opposite Civil Hospital, Gandhinagar, Gujarat 382006.

Sample size:

A total of 139 patients who fulfilled the research criteria. The statistical formula enabled calculation of the required sample size. The sample size was calculated using the statistical formula:

$$n = p(1 - p) \left(\frac{Z}{E} \right)^2$$

$$= 0.5(1-0.5) (1.96/0.05)^2$$

$$= 0.25 * 1536 = 384$$

Where, Z= Z value =1.96,
p= estimated prevalence of appropriate prescribing=0.5, E=margin of error

Inclusion criteria

- Adults aged 18 years and above
- Diagnosed with anemia
- Prescribed iron supplements (first-time or refill)

Exclusion criteria

- Incomplete prescriptions
- Anemia patients not prescribed iron supplements
- Patients taking iron-containing multivitamins for non-anemia indications

Study materials

Patient information sheet (PIS)

The Patient information sheet included information about the study in both Gujarati and English languages in accordance with ICH-GCP standards.

It included information about project like purpose of study, procedure and confidentiality.

Informed consent form (ICF)

The ICF was in accordance with ICH-GCP standards.

The inform consent form was translated into English and Gujarati language

Before the enrolment the participants were informed about the study and each participant were asked to give inform consent.

Data collection form

It was filled out by the investigator. The data collection was self-created. The form was designed to gather information about iron supplements that are prescribed to anemic patients who visit community pharmacies. The form had the following information:

1. Patient demographics
2. Haematology data
3. Drug treatment chart
4. Side effect information

Data analysis

The acquired data was analyzed using Microsoft Excel. Percentage calculations were performed for age, gender, BMI, pregnant status, income by occupation, and hemoglobin, as well as sum calculations for various salts and variables

Results:

Demographic characteristics

In the study 139 prescriptions were collected from anemic patients, in Gandhinagar from four different pharmacies. Iron deficiency anaemia was the most common among patients. The patient's data was categorised using an excel equation. Higher levels of anemia (34%) were seen in 47 individuals aged 26 to 35. 37% had no source of income, while 55% of people, including housewives and students, were unemployed. Among the female participants, 11% were in the second trimester, 6% were in the third, and 4% were in the first trimester.

Anemia classification

Based on WHO hemoglobin classification, 64% had moderate anemia, 22% mild, 9% severe, and 5% life-threatening anemia.

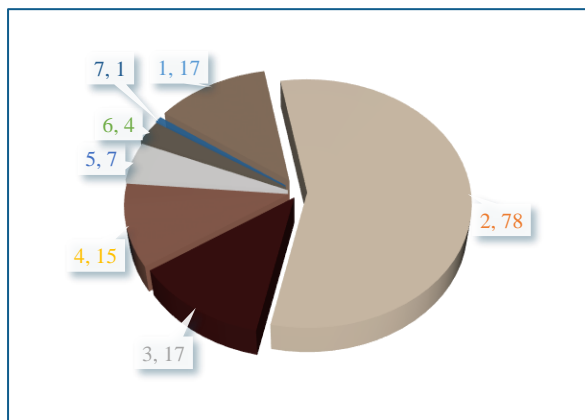
Table 1:
Distribution of haemoglobin as per WHO categorisation

Hemoglobin level (gm/dl)	Male n=7	Female n=132	Total patient N=132	Percentage (%)
Mild (11.5-10 gm/dl)	1	29	30	22
Moderate (9.9-8 gm/dl)	3	86	89	64
Severe (7.9-6.5 gm/dl)	3	10	13	9
Life threatening (<6.5 gm/dl)	0	7	7	5
TOTAL	7	132	139	100

WHO prescribing indicators

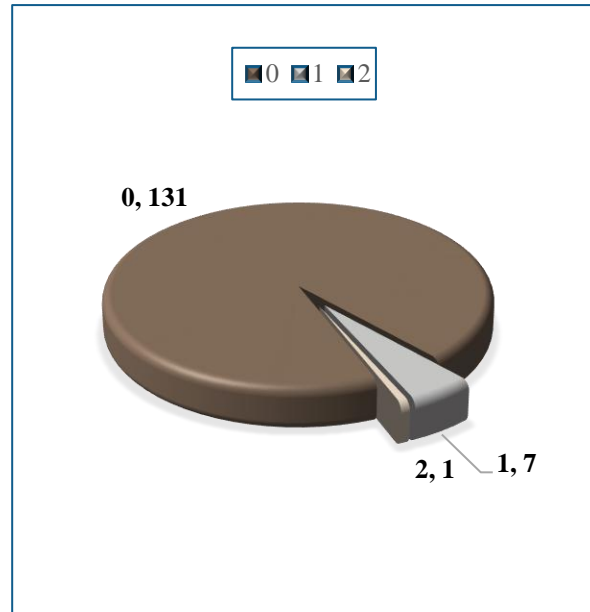
A total of 350 drugs were prescribed across 139 prescriptions.

Figure 1: Average number of drugs per encounter
Drugs per prescription, frequency of prescriptions



There were 2.5 medications on average each consultation. 1 prescription was with a frequency of 7 with the least common, while the majority of the drugs were two prescriptions with a frequency of 78.

Figure 2: Drugs prescribed by generic name
No. of drug with generic name, frequency of prescription



2.5% of drugs were prescribed by generic name. From 350 drugs prescribed, 7 (5%) prescriptions had 1 drug prescribed with generic name and 1 prescription had 2 drugs with generic name whereas 342 (98%) prescriptions were prescribed with brand name.

Figure 3: Drugs from National List of Essential Medicines (NLEM): 9%
No. of drugs, percentage of drug prescribed

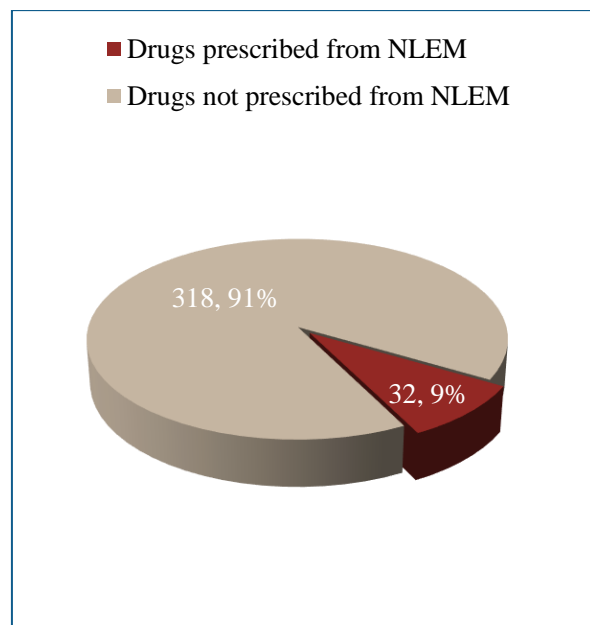
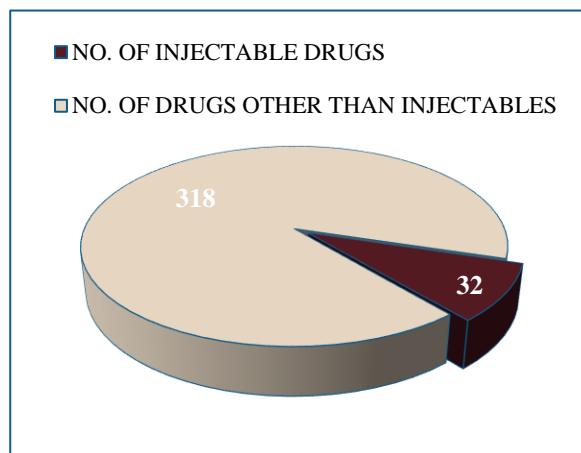


Figure 4: Injectable drugs

From 350 drugs prescribed, 32 drugs were prescribed as injectable and 318 drugs were prescribed as another form.



These findings indicate overprescribing, poor adherence to generic naming, and limited use of essential medicines, reflecting deviation from WHO's rational prescribing guidelines.

Frequency of iron supplement prescribed

Table 2: Frequency of 141 iron supplement prescribed
N=total no. of iron supplements, % percentage calculated

Iron supplement	Frequency N=141	Percentage (%)
Ferrous fumarate	61	43
Ferrous ascorbate	35	25
Ferrous gluconate	11	8
Iron sucrose	10	7
Carbonyl iron	6	4
Ferric ammonium citrate	6	4
Ferric carboxymaltose	4	3
Ferrous bisglycinate	3	2
Ferrous asparto glycinate	1	1
Ferric pyrophosphate	4	3
TOTAL	141	100

Ferrous fumarate comprised 61 (43%) of the 141 iron supplements that were prescribed, whereas ferrous asparto glycinate was the least common.

Elemental iron content of iron supplements**Table 3: Elemental iron content of iron supplements**

Iron salt	Dosage form	Brand name	Elemental iron (mg)
Ferrous fumarate	Tablet	Livogen-z	50
		Tonofolic-ds	98.6
		Tonofolic-z	50
		Ferrogen z	50
		Ferofit	49.3
		Ironet-z	50
	Capsule	Hb-up	66
		Globac z	50.1
		Autrin	98.6
		Vitcofol	98.6
Syrup	Vitcofol	32.8	
Ferrous ascorbate	Tablet	Livogen-xt	100
		Orofer xt	100
		Hb troy	100
		Fericip xt	100
		Haemogold xt	100
		Rubired	100
		Fur-total	100
		Defiron-xt	100
		Tonofolic-xt	100
		Ferocad xt	100
		Hb 29	100
		Iron and folic acid	100
		Irofer-xt	100
		Richar cr	100
		Feronia xt	100
		Fersita-xt	100
Ferrous gluconate	Capsule	R.b tone	30
		Gynae-c.v.p	8.4
	Syrup	Jp tone	23.3
Iron sucrose	Injection	Venofer	20
		Imax-s	20
		I won	20
		Orofer s 100	20
Carbonyl iron	Capsule	Ferry up	100
		Fefol-z	50
Ferric ammonium citrate	Syrup	Genfol iron tonic	19.8
		Dexorange	32.8
Ferric carboxymaltose	Injection	Cpink	50
		Rapifer fcm	50
Ferrous bisglycinate	Tablet	Ferronomic plus	30
		Hb fast-xt tablet	60
Ferric pyrophosphate	Tablet	Ferona	30
		Jectocos lipo table	30
Ferrous asparto glycinate	Tablet	F2 total	18

Factors influencing choice of anemia

Distribution of iron supplement as per age group

Ferrous fumarate was prescribed more in age group of 18 to 25 and 26 to 35. Ferrous bisglycinate was prescribed the least from all other salts.

Table 4: Distribution of iron supplement as per age group

Age group (yrs)	Ferrous Fumarate	Ferrous Ascorbate	Ferrous Gluconate	Iron Sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate
18 - 25	22	8	0	1	2	1	2	1	1
26 - 35	17	15	2	1	3	3	0	2	2
36 - 45	15	4	4	5	1	1	1	0	1
46 - 55	7	8	3	2	0	1	1	0	0
56 - 65	0	0	2	0	0	0	0	0	0
66 - 75	0	0	0	1	0	0	0	0	0
TOTAL	61	35	11	10	6	6	4	3	4

Females were prescribed more iron supplements. From the table, 58 females were prescribed ferrous fumarate, 33 females were prescribed ferrous ascorbate, 11 females were prescribed ferrous gluconate and 3 males were prescribed ferrous fumarate.

Distribution of iron supplement as per gender

Table 5: Distribution of iron supplement as per gender

Gender	Ferrous Fumarate	Ferrous Ascorbate	Ferrous Gluconate	Iron Sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate
MALE	3	2	0	1	0	0	1	0	0
FEMALE	58	33	11	9	6	6	3	3	4
TOTAL	61	35	11	10	6	6	4	3	4

Distribution of iron supplement as per occupation

Ferrous fumarate was the most prescribed among unemployed patients (26) and ferrous ascorbate was prescribed most in employed patients (22).

Table 6: Distribution of iron supplement as per occupation

Occupation	Ferrous Fumarate	Ferrous Ascorbate	Ferrous Gluconate	Iron Sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate
Employed	26	22	2	4	4	2	0	1	1
Unemployed	35	13	9	6	2	4	4	2	3
TOTAL	61	35	11	10	6	6	4	3	4

Distribution of iron supplement as per income

Ferrous fumarate was prescribed more in 26355-52733 Rs. group and ferrous ascorbate were prescribed more in middle group of income.

Table 7: Distribution of iron supplement as per income

Income (Rs.)	Ferrous Fumarate	Ferrous Ascorbate	Ferrous Gluconate	Iron Sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate
>52734 Rs. per month	8	5	2	2	0	2	1	1	0
13161-19758 Rs. per month	5	3	0	1	0	0	0	0	0
19759-26354 Rs. per month	8	9	0	3	2	0	0	0	0
26355-52733 Rs. per month	14	9	4	0	1	2	1	1	1
7887-13160 Rs. per month	0	1	1	0	1	0	0	0	0
2641-7886 Rs. per month	0	0	0	0	1	0	0	0	0
No income	8	5	2	2	0	2	1	1	0
TOTAL	61	35	11	10	6	6	4	3	4

Distribution of iron supplement as per family history

Majority of patients prescribed iron salt didn't had any family history. *n* = total no. of iron salt

Table 8: Distribution of iron supplement as per family history

Family history	Ferrous Fumarate	Ferrous Ascorbate	Ferrous Gluconate	Iron Sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate
With history	13	5	0	2	0	0	0	1	1
Without history	50	30	11	8	6	6	4	2	3
TOTAL	61	35	11	10	6	6	4	3	4

Distribution of iron supplement as per BMI

Ferrous fumarate prescriptions were higher for underweight people (14), and normal weight people (39). Underweight patients (5) and normal weight patients (25) received more ferrous ascorbate prescriptions.

Table 9: Distribution of iron supplement as per BMI

BMI	Ferrous Fumarate	Ferrous Ascorbate	Ferrous Gluconate	Iron Sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate
<18.5	14	5	2	3	2	1	1	0	0
18.5-25	39	25	7	5	2	5	3	1	4
25-30	7	4	2	2	1	0	0	2	0
>30	1	1	0	0	1	0	0	0	0
TOTAL	61	35	11	10	6	6	4	3	4

Distribution of iron supplement as per Pregnancy status

In ferrous fumarate (7) and ferrous ascorbate (4) was prescribed most in second trimester of pregnancy.

Table 10: Distribution of iron supplement as per pregnancy

Pregnancy trimester	Ferrous Fumarate	Ferrous Ascorbate	Ferrous Gluconate	Iron Sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate
First trimester	3	1	0	0	0	0	0	0	1
Second trimester	7	4	0	0	0	0	0	1	2
Third trimester	3	3	1	0	0	0	0	1	0

Distribution of iron supplement as per WHO hemoglobin categorisation

Mild and moderate anemia were the most common conditions for which ferrous fumarate was administered (12). Ferrous ascorbate was primarily given for mild anemia (11) and moderate anemia (22). Iron sucrose was the most recommended in cases of severe (5) and potentially fatal (5) anemia.

Table 11: Distribution of iron supplement as per WHO hemoglobin categorisation

Hemoglobin category	Ferrous Fumarate	Ferrous Ascorbate	Ferrous Gluconate	Iron Sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate
Mild (11.5-10 gm/dl)	12	11	0	0	1	2	0	0	2
Moderate (9.9-8 gm/dl)	44	22	10	0	5	4	0	3	2
Severe (7.9-6.5 gm/dl)	4	1	0	5	0	0	3	0	0
Life threatening (<6.5 gm/dl)	1	1	1	5	0	0	1	0	0
TOTAL	61	35	11	10	6	6	4	3	4

Distribution of iron supplements as per dietary.

Patients who adhered to an iron-rich diet had a mean hemoglobin level of 9.1, whereas those who did not had an average hemoglobin level of 8.8. The most common prescriptions among them were for ferrous fumarate to patients who followed the diet (22) or did not (39) and ferrous ascorbate to patients who did not follow the iron-rich diet (22). Among patients who ate foods high in vitamin C, ferrous fumarate (51) and ferrous ascorbate (27) were most frequently recommended.

Table 12: Distribution of iron supplement as per dietary

	Mean Hb	Ferrous fumarate	Ferrous ascorbate	Ferrous gluconate	Iron sucrose	Carbonyl iron	Ferric ammonium citrate	Ferric carboxymaltose	Ferrous bisglycinate	Ferrous pyrophosphate	Ferrous asparto glycinate
Follow a diet rich in iron											
Followed diet	9.1	22	14	2	1	2	3	1	3	4	1
Didn't followed diet	8.8	39	21	6	10	4	3	3	0	0	2
Consume Vitamin C- rich food to help iron absorption											
Consumed	9.1	51	27	6	3	6	6	1	3	2	2
Didn't consumed	7.7	10	8	2	8	0	0	3	0	2	1

Side effects and adherence

Only three patients reported side effects. Ferrous fumarate was linked to constipation, ferrous ascorbate caused dark stool and nausea, and ferric carboxymaltose led to nausea. Despite these, overall adherence remained high, especially among patients counselled by pharmacists.

Discussion

Prescription pattern mainly focuses on prescribing, dispensing, and administering drugs; the primary objective of PPMS is to support rational use of medications (RUM) [19]. WHO prescribing indicator is a tool that is used for prescription patterns that consist of a set of measurable characteristics that are expressed as the average number of drugs per encounter, the percentage of encounters with antibiotics or injections, the percentage of drugs prescribed by generic names, and the percentage of drugs from the essential drug list or formulary (EDL) [12]. The study analysed the prescribing patterns of iron supplements in anemic patients at different community pharmacies in Gandhinagar. This study found iron deficiency anemia in patients.

A total of 350 medications, including 141 iron supplements, were prescribed for 139 individuals whose prescriptions were evaluated.

Demographic detail

The age group of 26 to 35 years old comprised 34% of the participants in this study. Similarly, 38.1% of individuals aged 35–49 years had anemia, according to a study on the Iranian population by Elham Akbarpour et al. [20] This indicates that anemia was more common in adults than in the elderly.

In the study, anemia affected 7% of the males and 95% of the female. It indicates that anemia was more common in women than in men. This aligns with a study by Sarfaraz M. et al. [17] which discovered that 70% of women were anemic because of gynecological and menstrual problems, as well as an increased workload and responsibilities. 65% of the patients in our study fell into the normal weight category, 19% fell into the underweight category, and 2% were obese. According to a study by Alaa G. ELMoslemany et al.

[21], the prevalence of anemia is higher in underweight and normal weight individuals, with 45% of patients being underweight and 30% being of normal weight. Obese patients had the lowest proportion of anemia, at 20%. The absence of social and medical history of many patients was found due to incomplete documentation. Of the women in the study, 4% were in the first trimester, 11% were in the second, and 6% were in the third trimester. This aligns with a study by Sunil Baile [22], 26% of women were pregnant in the first trimester and 57% of women were pregnant in the second. Similar to research by Balla et al. [23], 54.14% of females were pregnant in the second trimester.

When patients were asked about their diet, 63% of them said they didn't follow any iron-rich diet, 56% said they ate iron-rich foods two to three times a week, and 77% said they ate foods high in vitamin C to aid in iron absorption. A study by Sarfaraz M et al. [24] revealed that 97.8% of patients were unaware that vitamin C-rich foods aid in iron absorption, and the majority of them ate fruits at a time other than before or after meals.

Hemoglobin is classified as mild, moderate, severe, and life-threatening by the WHO. 64% of the patients in this study had moderate anemia, 22% mild anemia, 9% severe anemia, and 5% life-threatening anemia. Similar findings were made by Vani Srinivas et al. [25], who discovered that 64.2% of participants had mild anemia, 59 (36.2%) had moderate anemia, and just 1 (0.6%) had severe anemia. A. Verma et al. [26] showed that the prevalence of mild and moderate anemia was 36.6% and 22.4%, respectively.

Prescribing pattern of iron supplement using WHO Prescribing indicators

Of the 350 drugs prescribed, the average number of drugs per prescription was 2.5, with 78 prescriptions having two medications per prescription. Similarly in a study by Jimma Likisa Lenjisa et al. [27] found an average of 2.1 drugs per prescription, indicating the presence of overprescription. 2.5% of medications were prescribed with a generic name and research by Kumari et al. [28] in Lucknow, India, indicated that less generic prescriptions were written. One antibiotic was prescribed in 3% of prescriptions. Galappatthy et al.'s cross-sectional survey conducted in Sri Lanka [29] revealed that 23.8% of people used antibiotics. 32 (9%) of the medications in our study were injectables, while 318 (91%) were non-injectable medications. These findings are consistent with those of Amaha et al. [30] discovered that at least one injection was included in 7.8% of all prescriptions. In contrast to a study conducted in Sri Lanka by Galappatthy et al. [29], indicated that 68.8% of drugs were dispensed from the essential drug list, just 9% of prescriptions were from the national list of vital medications. This demonstrates a lack of compliance with WHO guidelines. Frequency of iron supplement prescribed indicates that of the 141 iron supplements, ferrous fumarate (43%) and ferrous ascorbate (25%) were the most commonly recommended. The least amount of ferrous asparto glycinate was administered.

According to a study by Purushottam B. Jaju and Shruti B. Bhavi [31], oral iron is beneficial, and oral supplements were the most commonly administered. Factors influencing the choice of iron supplement according to age-wise, ferrous fumarate was administered to 22 people in the 18–25 age group and ferrous ascorbate to 15 people in the 26–35 age group. Ferrous fumarate and ferrous ascorbate were prescribed in people aged 18 to 25, particularly young women who need more iron because of menstrual blood loss. According to a study by Narendra Malhotra et al. [32], ferrous ascorbate was most commonly recommended in the age range of 26 to 35. It was shown to be well tolerated and to increase hemoglobin levels.

In the study iron supplements were prescribed more in female than male. 58 females were prescribed ferrous fumarate, 33 females were prescribed ferrous ascorbate, 11 females were prescribed ferrous gluconate and 3 males were prescribed ferrous

fumarate. In a study conducted in anaemic middle class Maharashtrian women by Tumbi Z et al. [33] found that ferrous fumarate was increasing hemoglobin levels, serum ferritin, and transferrin saturation, leading to improved physical work capacity in females. Four patients received iron ascorbate prescriptions, primarily in the second trimester, while seven patients received ferrous fumarate prescriptions. Pregnant women responded well to ferrous fumarate, according to research by Bhavi and Jaju [31]. Ferrous ascorbate increased hemoglobin, had fewer negative effects, and improved compliance, according to Chavan et al. [34].

According to WHO, hemoglobin levels can be classified as mild (11.5–10 g/dl), moderate (9.9–8 g/dl), severe (7.9–6.5 g/dl), or life-threatening (<6.5 g/dl). Ferrous fumarate was prescribed to the 44 participants in this study who had mild anemia. Similarly, ferrous fumarate was found to be more efficient in a study conducted by Liu et al. [35]. According to a study by Kriplani et al. [36], iron sucrose was most useful in 5 severe and 5 life-threatening conditions. It was found to be beneficial in raising serum ferritin, hemoglobin, and other haematological markers. Patients who adhered to an iron-rich diet had a mean hemoglobin level of 9.1, whereas those who did not consumed iron had an average hemoglobin level of 8.8. Of these, 22 patients who followed the diet and 39 who did not followed diet, were prescribed ferrous fumarate the most, respectively, whereas 21 patients who did not follow the iron-rich diet received the most ferrous ascorbate. Patients who consumed vitamin C-rich foods were the ones who received the most 55 patients were prescribed with ferrous fumarate, followed by 27 patients prescribed with ferrous ascorbate.

Among 139 patients, 3 patients had complained of side effect. From which ferric carboxy maltose showed nausea, in a case report of ferric carboxymaltose by Thanusubramanian H et al. reported nausea from ferric carboxymaltose. Whereas ferrous ascorbate linked to dark stool and nausea and ferrous fumarate was reported for constipation.

Conclusion

This study evaluated the prescribing patterns of iron supplements among anemic patients visiting community pharmacies in the Gandhinagar district. The findings showed that iron deficiency anemia, with a higher frequency in females than males. Anemia was most common in people aged 26 to 35, particularly pregnant women in their second trimester. The majority of individuals had mild anemia. Based on WHO prescribing indicators revealed overprescription, limited usage of generic pharmaceuticals, and a reduced proportion of prescriptions from the essential drug list, indicating poor compliance with WHO recommendations. Oral iron supplements were the most frequently given, with ferrous fumarate and ferrous ascorbate being the most common formulations.

Limitation

- The study was one time data collection.
- The study was done in limited community pharmacies.
- Some prescribed drugs did not align with the National List of Essential Medicines (NLEM).
- A larger sample size is needed to provide better information.
- This study can also be conducted in hospital settings or among inpatients.

Future Scope

- The study could provide data to specialized training programs for pharmacists, improving their knowledge about anemia treatment and patient care.
- Since the study was conducted for a short duration in a specific district, expanding the research to different areas and healthcare setups would provide a more comprehensive understanding of iron supplement prescription patterns.
- The study can be conducted with a larger population over an extended period would yield more robust data and help identify long-term trends and outcomes in anemia treatment.

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