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Original Research Article

Palatability of micro-encapsulated iron pyrophosphate (Ferfer®)

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ABSTRACT

Background: Iron deficiency is the leading cause of anemia globally and affects 20% of world adult population. The general practice for replacement of iron reserves is oral supplementation. However, the success of this strategy solely depends on drug adherence and compliance. Where many other factors contribute to compliance, the role of taste of the medicine can also not be neglected. The aim of this study is to evaluate the palatability of micro-encapsulated iron pyrophosphate (Ferfer) and compare its taste with previously taken other oral forms of iron supplements.
Methods: The study was conducted with 231 female participants of age more than 18 years. Participants had taken one sachet of micro-encapsulated iron pyrophosphate (Ferfer) for the purpose of taste. Questionnaire based on their previous experience of iron supplements and palatability of Ferfer was asked by participants based on 0-10 mm visual analogue scale and 5 point Likert scale evaluating responses at 0 minute, 5 minute, and at 10 minute. Data was analyzed by using SPSS version 23.
Results: The women previously taking some others oral form of iron supplementation scored their supplements, a mean taste score is 2.92±2.44 on the VAS. However, micro-encapsulated iron pyrophosphate (Ferfer) received a mean score of 7.66±1.32 immediately after taking it and a score of 7.96±1.37 after 5 minutes on the 0-10 mm VAS. 81.4% patients will recommend their doctors to prescribe Ferfer to them in future.
Conclusions: Enhanced palatability of micro-encapsulated iron pyrophosphate sachets have resulted in increased compliance to the supplementation regimen among the participants.

Keywords: Iron deficiency anemia, Iron supplements, Iron palatability, Compliance, Micro-encapsulated iron pyrophosphate

INTRODUCTION

Deficiency of iron is a dormant state which only results in symptomatic anemia when the synthesis of hemoglobin is impaired. Iron deficiency is the leading cause of anemia globally and affects 20% of world adult population. Inadequate intake of iron, decreased iron absorption from the gut, and physiological or pathological blood loss contributes to iron deficiency.[1] Age groups prone to developing iron deficiency anemia (IDA) include children of age less than 5 years, pregnant women, and women of childbearing age.[2] Iron deficiency anemia (IDA) has become a global public health concern which affects 17% of women across the world including 15% non-pregnant and 19% pregnant women.[3] Commonly affected regions are South Asia and Africa because being resource constraint countries, poverty, and poor dietary habits heightens the disease burden.[4]

Pakistan has overwhelming prevalence of iron deficiency among its children and women of childbearing age. IDA prevalence is reported to be between 30-60% among Pakistani women.[5,6] The rates of maternal (276 per 100,000 live births) and perinatal mortality (75 per 1000 pregnancies) are significantly high in Pakistan and both

are a consequence of acute blood loss in preexisting IDA.[7,8]

In Pakistan, the general practice for management of IDA is oral supplementation. However, the success of this strategy solely depends on drug adherence and compliance. Many combinations of oral iron are available in the market including ferrous sulphate, and ferrous gluconate. Oral iron is available in the form of tablets, suspension, and absorbable sachets.

The factors decreasing oral iron supplement compliance have been studied thoroughly. The non-patient factors include inadequately supported programs and insufficiently delivered services. Patient factors include misunderstanding the instructions, frustration about the frequency and number of tablets, migration to areas with no supported programs, and side effects.[9] Long-term use of oral iron is limited by side effects including gastrointestinal effects and a repulsion to its taste.[10] Patient compliance is linked to perceived supplement taste, which may be affected by a variety of taste changes reported by participants both before and after therapy.[11]

Newer studies are being conducted to help solve this basic issue. Scientists are experimenting with weak cation exchange resins to help mask the metallic taste of iron suspensions.[12] The formula experimented in this study is also a new technique of taste masking of micro-encapsulated iron pyrophosphate.

The aim of this study is to evaluate the palatability of micro-encapsulated iron pyrophosphate and compare its taste with previously taken other oral forms of iron supplements.

METHODS

The study was conducted from 1st December 2017 to 30th January 2018 at Aziza Hussaini Karachi and Ganga Ram Hospital, Lahore. It included 231 female participants of age more than 18 years, who were able to understand the study procedure and give their verbal informed consent. Individuals who had known allergic reaction to Iron supplements were excluded from the study.

After taking the informed consent, the participants were handed over one sachet of micro-encapsulated iron pyrophosphate (Ferfer) for tasting. Each sachet containing 1.5 grams and contains 14 milligram of iron, 80 milligram of vitamin C, and 2.5 microgram of vitamin B12.

Questionnaire based on their previous experience of iron supplements and palatability of micro-encapsulated iron pyrophosphate (Ferfer) was filled by participants. The questionnaire was based on Visual Analogue Scale and 5 point Likert scale evaluating responses at 0 minute, 5 minute, and at 10 minute.[13] Overall palatability was assessed by putting a mark along the 0-10 millimeter VAS where higher score indicated better palatability. A 5-point Likert scale was also used with options of "very poor taste", "poor taste", "neither good nor bad", "good taste", and "very good taste".

Data was analyzed by using SPSS version 23. Frequency and percentages were computed for categorical variables like gender, preferences etc. Mean±Standard deviation was computed for numerical variables like age.

RESULTS

Table 1: Patients perception of taste with previous oral iron therapy (n=193).

Variable	Value
Iron supplement used	
Ferrous sulfate	62 (32.12)
Ferrous gluconate	94 (48.07)
Iron polymaltose	37 (19.17)
Taste of previous iron supplement	
VAS score (1-10)	2.92±2.44
Likert score	
Very poor taste	135 (69.94)
Neither good nor bad taste	33 (17.09)
Very good taste	25 (12.95)
Adverse effects associated	
Gastrointestinal upset (nausea, vomiting, dyspepsia, constipation)	118 (61.13)
Metallic taste	39 (20.20)
Black stool	26 (13.47)
No adverse effect	10 (5.18)

Table 2: Palatability of Ferfer (iron pyrophosphate, vitamin c, B12) and patients perception (n=231).

Variable	Value
Taste at 0 minute	
VAS score (1-10)	7.66±1.321
Likert score	
Very poor taste	1 (0.4)
Neither good nor bad taste	28 (12.1)
Very good taste	202 (87.4)
Taste at 5 minutes	
VAS score (1-10)	7.96±1.376
Likert score	
Very poor taste	6 (2.59)
Neither good nor bad taste	8 (3.5)
Very good taste	217 (93.9)
Metallic taste at 10 mins	
Yes	23 (10.0)
No	201 (87.0)
Don't know	7 (3.0)
Perception of taste	
Sweet	182 (78.7)
Citrus	45 (19.4)
Bitter	4 (1.73)

Total 231 females were included with a mean age of 27.63±6.01 years. Of these women, 32.12% were previously taking ferrous sulphate supplements, 48.07% were taking ferrous gluconate supplements, while 19.17% were taking Iron polymaltose. On the 0-10 millimeter visual analogue scale, these women gave a mean score of 2.92±2.44 to the taste of their iron supplement.

All 231 females were introduced with micro-encapsulated iron pyrophosphate and their responses on the taste of micro-encapsulated iron pyrophosphate (Ferfer) were noted. The participants gave a mean score of 7.66±1.32 to the taste of Ferfer immediately after taking it and a score of 7.96±1.376 after 5 minutes. Only 23 women (10%) sensed a metallic taste in Ferfer (Table 2). Around 81.4% patients will recommend doctors to prescribe micro-encapsulated iron pyrophosphate (Ferfer) to them in future if oral iron therapy required.

DISCUSSION

It has been established that the mainstay of iron supplementation therapy is compliance and adherence to the supplements. Many studies with other drugs such as anti-retroviral drugs and antibiotics have shown how decreased palatability negatively effects drug adherence.[14,15] When the unpleasant taste of iron supplements was studied to markedly reduce its adherence among iron deficient individuals, strategies surfaced to overcome this barrier.[10,11] These included powdered, microencapsulated form of ferrous fumarate, single-dose sachets that can be added to food, and drops or sprinkle form of iron supplementation.[16] Lutsey et al has shown a negative association of dislike of taste with the percentage of pills that were consumed by the participants of their study.[10]

Deficiency of iron and its associated anemia has been a distressing problem for the healthcare providers of the developing world. It is prevalent among children and premenopausal women.[17] In pregnant women who are iron deficient, the adverse outcomes not only affect the mother but also the newborn in both short and long term. Anemia in pregnancy is associated with low birth weight, and preterm delivery.[18] Iron deficiency has shown its grave outcomes in both women and children. IDA of early childhood is known to predispose these children to poor emotion regulation in adolescence which results in excessive alcohol use, risky sexual behavior, and attentional control deficits at age.[19]

In a study conducted in Ghana, 557 anemic children were divided into two groups– one received a daily sachet of microencapsulated ferrous fumarate in powder form plus ascorbic acid to be sprinkled onto any complementary food eaten (sprinkles group) and the other group received ferrous sulfate drops 3 times/d for 2 months.[20] Successful treatment occurred in 58% of the sprinkles group with 67% compliance to treatment; and in 56% of the drops group with 81% compliance to treatment.

As in another study, metallic taste was experienced by 15% of the sample taking oral ferrous sulphate as compared to only 2% taking iron polymaltose complex.[21] In another recent study between two types of oral iron supplementation, none of the patients in sodium feredetate group experienced metallic taste while 20% in ferrous sulphate group reported metallic taste as a significant side effect.[22]

Micro-encapsulated iron pyrophosphate tablets with the brand name FERFER manufactured by PharmEvo. Pvt. Ltd showed increased palatability as compared to other forms of oral iron supplements. Enhanced taste consequently improves patient's adherence to the supplements. It directly dissolves in the mouth without the need for water. The technology of liposomal microencapsulation, allows daily iron supplementation without any of the typical side effects of conventional oral iron supplements, such as heartburn, diarrhea, constipation, nausea and discoloring of the mucous membranes and of the stools, which increases patient compliance. It has no metallic taste or smell, does not discolor mucous membrane and has excellent tolerability. Another study with the objective of rise in hemoglobin with micro-encapsulated iron pyrophosphate tablets is also in the data collection phase and we will be sharing its results once study completed.

As supported by the existing literature, this study implies that as a pleasant taste of iron supplements will pan out to be an effective measure in enhancing the compliance of iron deficient individuals to their supplementation regimen.

CONCLUSION

It is concluded that iron deficiency is an afflicting and prevalent healthcare issue in the underdeveloped and low income countries. Increasing compliance to medication is an essential step towards overcoming this nutritional deficiency. Enhanced palatability of micro-encapsulated iron pyrophosphate sachets have resulted in increased fondness from the study participants and consequently increased adherence to their supplementation regimen.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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