Prevalence of iron supplementation among pregnant woman in Taif, Saudi Arabia: a cross sectional study

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Abstract

Background: Deficiencies in iron during pregnancy may negatively impact the health of the mother, the pregnancy, as well as fetal development. Aim: Several studies evidenced that there is poor compliance with prenatal iron supplements during the antenatal period. More studies are needed to assess the prevalence, compliance and influencing factors of iron supplement among pregnant women. Methods: A cross-sectional study was carried out to assess the iron supplementation practice and influencing factors among pregnant woman in different hospitals of Taif city, Saudi Arabia. Results: The prevalence of iron supplements use during pregnancy among the study participants was 99.6%. There was no significant association between the age, weight and number of pregnancies (p value >0.05). There was significant association in status of previous pregnancy (p value = 0.014). Women with healthy previous pregnancies appeared to consume iron supplement more than women with problems in their previous pregnancies. Pregnant women aged between 30-44 years were more likely to be adherent to iron supplement (30%). Mothers who had University education were more likely to be adherent to iron supplement than others (35%). Conclusion: There is a need to encourage pregnant women to visit early for antenatal care. Iron and folic acid supplements, dietary intake preferences, diagnosis and continuous follow up of pregnant women are approaches to reduce anemia during pregnancy in Taif region. The purpose of this study was to enhance the public awareness about iron supplements during pregnancy.

Key words: Iron supplements; anemia; pregnant women; prevalence.

Background

According to the World Health Organization, around 2 billion people, amounting to over 30% of the world's population are anemic, where Preschool children and women of reproductive age are particularly affected [1]. Iron deficiency is the most common cause of anemia and is the most widespread nutritional disorder affecting a large number of children and women in developed and developing countries. It is estimated that 56 million pregnant women are affected with anemia globally, largely due to iron deficiency. In developing countries such as South-East Asia, this proportion can be as high as 85%, making pregnant mothers especially susceptible to increased risk of mortality and reduced work capacity [2]. The main causes of iron deficiency include a diet poor in absorbable iron, increased requirement for iron (e.g. during pregnancy) not covered through the diet, loss of iron due to parasitic infections (particularly hookworm), and blood losses. The consequences of iron deficiency anemia are serious and may include diminished intellectual and productive capacity and possibly increased susceptibility to infections [3]. It is a risk factor for perinatal complications like perinatal infection, pre-eclampsia, low birth weight, prematurity, and perinatal mortality risks. Earlier studies showed strong evidence that iron supplementation with or without folic acid, results in a significant reduction in the incidence of anemia during pregnancy [4, 5]. Studies suggested that hemoglobin below 11 g/dl increased the risk of preterm birth, low birth weight, and small gestational age in the first trimester and the risk of low birth weight in the third trimester [6, 7].

The overall requirement of iron during pregnancy is high due to expansion of maternal red blood cell mass during pregnancy and support of feto-placental development [8]. Even though mobilization of iron deposits with increased iron absorption occurs during pregnancy, iron requirements are difficult to counterbalance by diet alone, despite taking fortified food and supplementation [4]. Thus, it is important that the women commence gestation with a good iron status to avoid the risks produced by high antenatal doses of iron, even if considered preventive or therapeutic. The benefit of the early iron supplementation in women with insufficient reserves is well documented but there is contradictory evidence regarding the effect of iron supplementation during gestation in iron deficient women. While some authors have observed that the iron supplementation in these women is beneficial for the newborn, others have indicated that it could provoke an excess of iron which can induce oxidative stress and haemo-concentration; factors that can negatively influence the health of the mother and the development of the fetus [9]. It is well established that iron supplementation, with or without folic acid during pregnancy, substantially improves maternal health and pregnancy outcomes [10]. In fact, the provision of iron supplements to pregnant women is one of the most widely practiced public health measures. However, there is no consensus worldwide regarding the optimum iron dose for supplementation during pregnancy, with recommendations varying between 30 and 200 mg/day [11]. Recommendations not only vary by iron dose, but also by whether iron supplementation is routine (treatment of all pregnant women regardless of their iron status) or selective (only women with or at risk of developing iron deficiency or iron deficiency anemia) , and whether iron supplementation is for prevention or treatment of iron deficiency anemia and or iron deficiency. All these facts were taken into consideration, and the study was designed to investigate the prevalence and determining factors of iron supplementation in pregnant women in Taif, Saudi Arabia. In addition, iron supplementation practice, reasons for supplementations and the level of compliance to iron and its associated factors were also examined.

Methods

1. Study design, setting and target population

A cross-sectional study was conducted from January 2020 to March 2020. The study was performed on pregnant women in 3 centers namely Al-Hada Armed Forces Hospital, Prince Mansour Armed force Hospital and Al-Adwani Hospital at Taif Region, Saudi Arabia. Pregnant women (n=310) were randomly selected for the study. Verbal consent was obtained from each pregnant woman prior to inclusion in the study. All subjects remained anonymous and participation was voluntary. Also, all records and data remained confidential for research purposes only.

2. Exclusion criteria

Women with any acute or chronic illnesses, anemia due to any chronic illness, history of blood transfusion in the present pregnancy and those who receive iron intravenously were excluded from the study.

3. Inclusion criteria

Pregnant women (at any stage of pregnancy) with age over 16 years were included. Similar population having haemoglobin level over 3 g/dl, gestational diabetes, hypertension, smokers, or non-smokers, taking different types of iron supplement during pregnancy were also included in the study.

4. Data collection

Self-administered questionnaires in Arabic and English languages were distributed to determine the iron intake from various sources and reasons for supplementing iron during their pregnancy. It also estimated the prevalence of iron deficiency and iron deficiency anemia and compliance among pregnant women along with encountered complications. A pilot study on 20 pregnant women was carried out to ensure that the research instrument is clear, well-written and will acquire the desired responses. The results of this pilot study are not included in the final results. The questionnaire consisted of two parts; the first part included the demographic data; the second part contained the obstetrics related characteristics, sources and reasons for supplementing iron as well as reasons for compliance and non-compliance.

5. Statistical analysis

Statistical Package for Social Science version 22 Inc., Chicago IL, USA, was used to enter, process, and analyze the data. Mean and frequencies as percentages were used to describe the variables. Chi-square and Fisher's exact tests were used to determine the association between the women's demographic characters and the different variables. The significance of the differences was calculated at a 95% confidence interval and P value < 0.05 was considered as statistically significant.

Results

The questionnaires were collected from the period of January 2020 to March 2020. A total of 310 pregnant women were enrolled to fill in the questionnaire. Table 1 shows the baseline characteristics of the study participants. Most of the participants (57%) were aged between 30-44 years, 95% of them were Saudi national and 97% of them did not smoke. Approximately, 96% of participating women consumed a mixed diet, 3% were reported as vegetarian while 0.3% as vegan. The prevalence of iron supplements use during pregnancy among the study participants was 99.6% (Figure 1). Table 1 shows the prevalence of iron supplement among participants according to their answers to the related questions. Approximately, 77% of participating women had two or more pregnancies. While about one-fifth of participants (17%) stated that they had miscarriage in previous pregnancies. A total of 8% of participants reported that they had gestational diabetes, 1% had gestational hypertension and 0.6% suffered from both. Only 3% of women suffered from heavy bleeding before or after their last birth. Results revealed that about 42% participants had iron deficiency while 0.6% had anemia. A total of 45% of participants were diagnosed with iron deficiency in the first trimester, 44% in the second trimester and 10% in the third trimester. The majority of the participants (73%) administered a daily dose of iron supplement, while 2% took a weekly dose and 25% took it irregularly. The majority of women (75%) reported using iron fortified cereals while a quarter (25%) did not consume them. Maximum percentage of women (89%) were eating red meat during their pregnancy, while almost 87% of the participants used food supplements. About 34% of women were aware about foods that prevent iron absorption, and 66% of participants had no idea. On the other hand, 38% of participants received counseling about proper nutrition during pregnancy and about 62% had not received any counseling.

Factors related to iron supplementation during pregnancy were tested and are depicted in Table 1. There were no significant differences between the age, weight and number of pregnancies (p value >0.05). There was significant difference observed in status of previous pregnancy (p value 0.014). Participants with previous healthy pregnancy appeared to consume iron supplements more than women with problem in their previous pregnancies. Most iron supplement doses used by study participants (69%) were the preventive dose (30-99 mg/day); while 17% used the treatment dose (>100mg/day); less than one third (8.3%) used the low dose (<30mg/day); while 5% of the participants had no knowledge about doses. The majority of participants reported to have supplemented iron in the form of iron sulfate (Figure 2).

Figure 1. The prevalence of iron supplements uses during pregnancy.

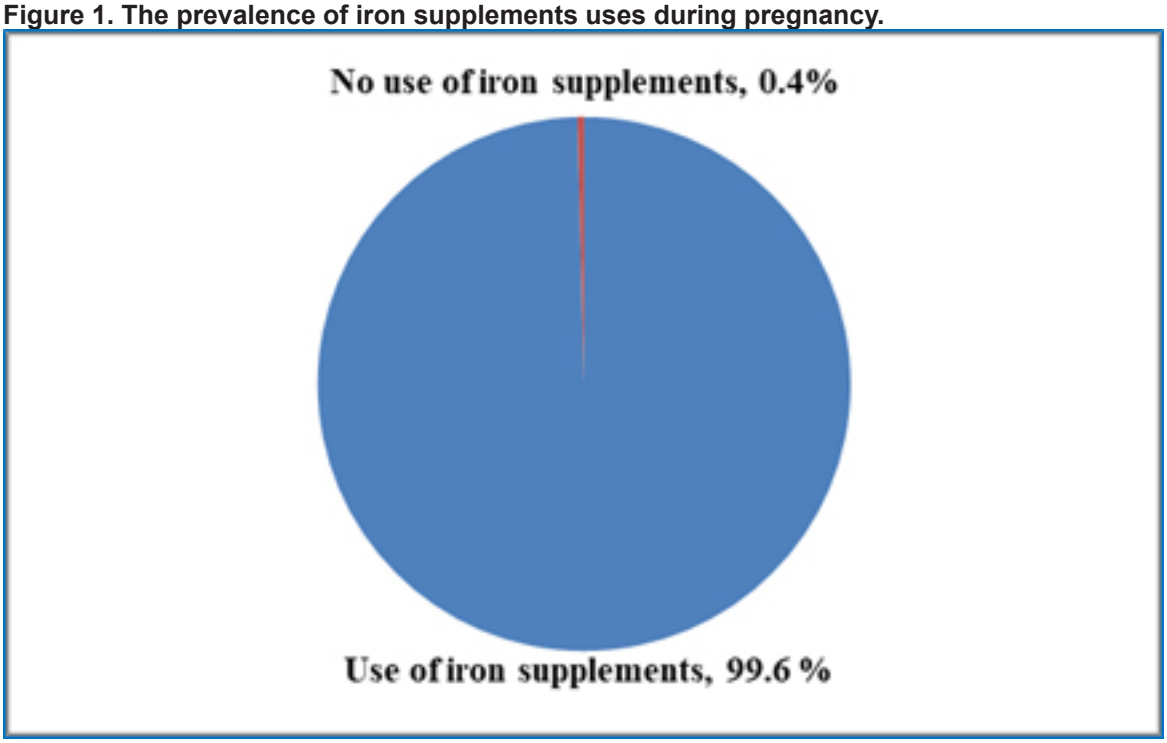

Table 1: Association between iron supplementation and sociodemographic/maternal data and determining factors of iron supplementation

Characteristics	Frequency	Percentage	p-value
Age			
16-29	99	32%	
30-44	178	57%	0.34
>45	32	10%	
Weight (kg)			
≤45	20	6%	
46-60	105	34%	0.74
61-80	133	43%	
>80	51	16%	
Height (cm)			
150-160	218	70%	0.81
161-170	85	27%	
171-180	6	2%	
BMI			
Normal weight	166	54%	
Overweight/obese	116	37%	0.65
Underweight	27	9%	
Nationality			
Saudi	295	95%	0.82
Non-Saudi	14	5%	
Education level			
University	205	66%	
High school	71	23%	
Intermediate school	19	6%	0.97
Primary school	13	4%	
Illiterate	1	0.3%	
Working			
Yes	136	44%	0.37
No	173	56%	
Wealth level			
Rich	45	15%	
Medium	255	82%	0.9
Poor	9	3%	
Smoking			
Yes	2	0.6%	
No	302	97%	0.98
Stopped	5	2%	
Diet			
Vegetarian	10	3%	
Vegan	1	0.3%	0.98
Mix	298	96%	
First pregnancy			
Yes	71	23%	0.58
No	238	77%	
Number of children			
0	69	22%	
1	35	11%	0.72
2-3	133	43%	
>4	72	23%	

Table 1: Association between iron supplementation and sociodemographic/maternal data and determining factors of iron supplementation (continued)

Type of pregnancy			
Single	297	96%	0.84
Twin	12	4%	
Status of previous pregnancy			
Miscarriage	54	17%	
Iron deficiency	37	12%	
Anemia	22	7%	
Heavy bleeding during delivery	8	3%	0.014*
None	188	61%	
Pregnancy problem			
Gestational diabetes	26	8%	
Gestational hypertension	4	1%	0.99
Both	2	0.6%	
None	277	89%	
Diagnosed with iron deficiency/anemia			
Iron deficiency			
Anemia	110	42%	0.61
Normal	2	0.6%	
	151	57%	
Time of iron deficiency diagnosis			
First	54	45%	
Second	52	44%	0.19
Third	12	10%	
Time of using iron supplement			
Long before pregnancy	23	7.4%	
When planned to become pregnant	6	1.9%	
Once came to know about pregnancy	35	11.3%	0.063
Once have iron deficiency	25	8%	
First trimester	63	20.3%	
Second trimester	135	43.5%	
Third trimester	22	7%	
Dose of iron supplement			
Low dose	26	8.3%	
Preventive dose	213	69%	0.19
Treatment dose	54	17%	
Use of iron fortified cereals			
Yes	231	75%	0.56
No	78	25%	
Eat red meat			
Yes	275	89%	0.72
No	34	11%	
Use of iron fortified juices			
Yes	180	58%	0.39
No	129	42%	
Use of other food supplements			
Yes	269	87%	0.7
No	40	13%	

Figure 2: Different types of iron supplements consumed by the participants.

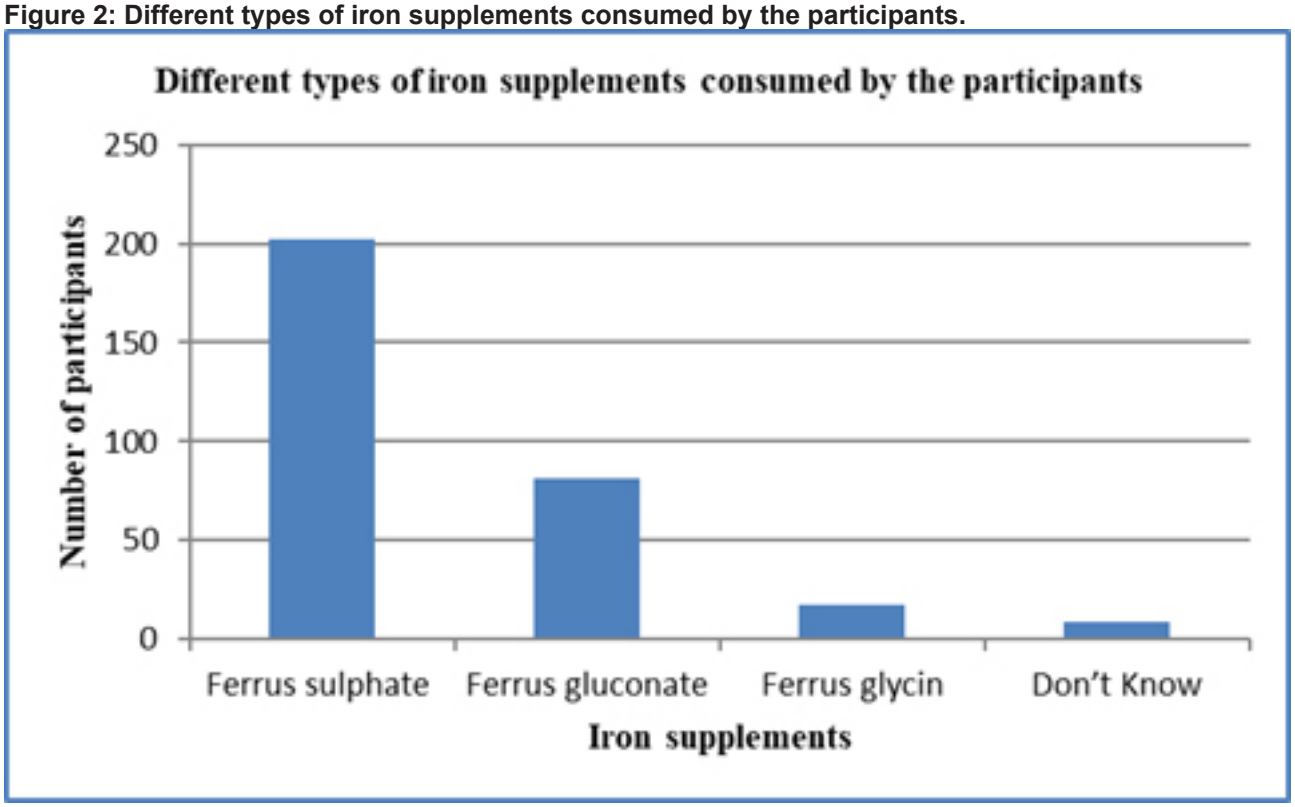

Figure 3. Prevalence of side effects of Iron supplements in pregnant women.

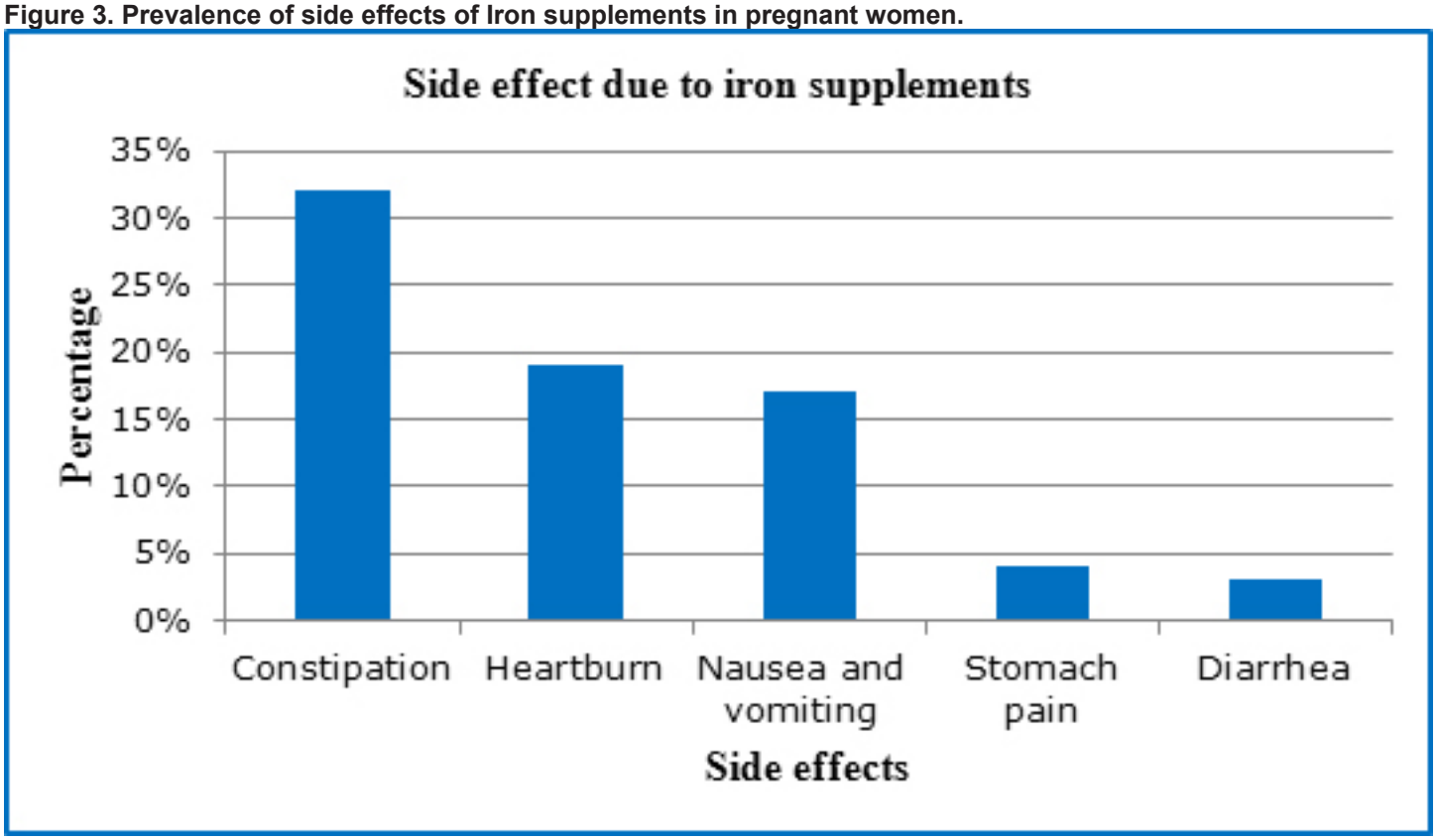

Table 2: Associated factors of iron supplement compliance among pregnant women.

Variables	Compliance	p-value	Non-compliance
Age (n=310)		0.42	
16-29	53 (17%)		47 (15%)
30-44	94 (30%)		84 (28%)
>45	13 (4%)		19 (6%)
Education		0.20	
University	107 (35%)		99 (32%)
High school	41 (13%)		30 (9%)
Intermediate school	7 (2%)		12 (4%)
Primary school	4 (1%)		9 (3%)
Illiterate	1 (0.3%)		0 (0.00%)
Work		0.27	
Yes	75 (24%)		61 (20%)
No	85 (27%)		89 (29%)
Wealth level		0.15	
Rich	26 (9%)		19 (6%)
Medium	132 (43%)		124 (40%)
Poor	2 (0.6%)		7 (2%)
Smoking		0.15	
Yes	0 (0.00%)		2 (0.6%)
No	156 (51%)		147 (47%)
Stopped	4 (1%)		1 (0.3%)
Diet		0.50	
Vegetarian	6 (2%)		4 (1%)
Vegan	0 (0.00%)		1 (0.3%)
Mix	154 (50%)		145 (47%)
First pregnancy		0.00	
Yes	51 (16%)		20 (6%)
No	109 (36%)		130 (41%)
Number of children		0.002*	
0	49 (16%)		20 (6%)
1	19 (6%)		16 (5%)
2-3	62 (20%)		72 (23%)
>4	30 (10%)		42 (13%)
Type of pregnancy		0.63	
Single	153 (49%)		145 (46%)
Twin	7 (2%)		5 (7%)
Status of previous pregnancy		0.011*	
Miscarriage	28 (9%)		26 (8%)
Iron deficiency	11 (4%)		26 (8%)
Anemia	10 (3%)		13 (4%)
Heavy bleeding before or after birth	2 (0.6%)		6 (2%)
None	109 (36%)		79 (25%)
Reason for non-compliance		0.80	
Forgetting	1 (0.7%)		37 (24%)
Better get it from natural source	0 (0.00%)		18 (11%)
Because of side effects	4 (3%)		92 (61%)

Table 2: Associated factors of iron supplement compliance among pregnant women. (continued)

Side effects		0.19	
Constipation	25 (15%)		53 (32%)
Diarrhea	1 (0.6%)		5 (3%)
Nausea and vomiting	6 (4%)		28 (17%)
Heartburn	8 (5%)		31 (19%)
Stomach pain	0 (0.00%)		7 (4%)
Use of iron fortified cereals		0.55	
Yes	122 (39%)		110 (35%)
No	38 (12%)		40 (13%)
Eating red meat		0.59	
Yes	141 (45%)		135 (44%)
No	19 (6%)		15 (5%)
Use of iron fortified juices (n=310)		0.55	
Yes	96 (31%)		85 (27%)
No	64 (21%)		65 (21%)

Table 2 depicts the association between different factors and compliance to iron supplement during pregnancy, in the study participants. The results indicated that all these factors were not statistically significantly associated with compliance to iron supplements ($p>0.05$). Pregnant women aged between 30-44 years were more likely adherent (30%) to iron supplements. No significant association between family income and rate of compliance was observed. In contrast, education had a significant effect on compliance. Mothers who had University education were more likely to be adherent (35%) to iron supplements than others with a low level of education. Mothers with mixed diet showed better compliance (50%), in contrast with vegetarian mothers (2%). Participants who had two or more pregnancies showed a 36% adherence rate. Rate of compliance in women who had normal previous pregnancy (36%) were significantly higher ($p=0.011$) than those who had previous pregnancy risk status such as iron deficiency (9%), anemia (4%), miscarriage (3%) and heavy bleeding (0.6%). High prevalence rate of constipation (32%), is likely to be the most prominent reason for non-adherence followed by heartburn (19%), nausea and vomiting (17%), stomach pain (4%) and diarrhea (3%) (Figure 3). Likewise, mothers who consume iron-fortified cereals (39%) and iron-fortified juices (31%) seemed to be more adherent.

Discussion

The present study estimated a higher prevalence rate (99.6%) of iron supplementation among pregnant women compared to the study performed in Germany (2018) that showed prevalence of 65.7% [11]. A total 42% of the participants in our study suffer from iron deficiency which is close to the prevalence rate of 35.3% found in a study conducted in Eastern Province of Saudi Arabia [12]. On the other hand, results of a study conducted in Danish and Norwegian pregnant women showed prevalence rate of 28% and 85%, respectively [13]. These differences may be attributed to variations among regions, nutritional composition, counseling and practice of iron supplementation by pregnant women. Our study also examined the compliance with iron and possible associated causative factors among pregnant women. Only 51.6% of the participants were compliant to iron supplements. In general, the compliance was relatively close to the results reported by Habib and colleagues (2009), where observed iron compliance was 50% [14]. In contrast, another study performed in Nepal reported 73% of total compliance with iron and folate supplementation [15]. In our study, the main reason for non-compliance was side effects (61%) followed by forgetfulness, whereas forgetfulness was the main factor in a study carried out by Siabani et al, 2018 in Iran [16]. However, this could be addressed with better counseling during antenatal visits and providing strategies that remind women to take their pills on time. Moreover, another study conducted in Nepal reported that the side-effects were the main barriers to adherence [17]. This was in line with our study. Educating women about the benefits of supplementation and managing side-effects would be useful.

Our study also showed that routine low-dose supplementation is well tolerated and associated with fewer side effects. Makrides and coworkers, 2003 reported that few side effects of low-dose iron supplementation during pregnancy may facilitate compliance [18]. Our study noticed high compliance among older age group participants and among women having 2-3 children. This may be due to women who had more children had a longer exposure to the messages of antenatal supplements that might have improved their compliance. Furthermore, older women may be more concerned about their health and pregnancy outcome, and get necessary support and cooperation from their family members. This finding was in line with studies conducted in India and Ethiopia where elderly and middle-aged women were slightly more compliant than younger women [19]. Education had a significant effect on compliance as reported by a study conducted in Saudi Arabia in 2009, which is similar to our study findings [14]. Pregnant women who had normal previous pregnancy were likely to be more adherent in contrast to the results reported in a study conducted in

Ethiopia in 2015, in which participants who consumed iron fortified cereals and juice had high compliance [19].

Our study finding reported very low prevalence of anemia (0.6%) that may be supported by the iron supplements, iron fortified cereals and mixed diet that is naturally rich in iron. Also, they routinely use iron supplements even in absence of any deficiency. In contrast, other studies conducted in other provinces of Saudi Arabia reported high prevalence rate of anemia such as in Jazan (58.9%) [20], Makkah (39%) [21], Riyadh (20.4%) [22] and Alkhobar (41.3%) [23]. However, a study conducted in Germany (2018) reported to have supplemented iron in form of iron sulfate which is the most common form [11]. The study encountered some limitations, such as the nature of the study design (cross-sectional) did not allow further evaluation of any apparent associations over time. The study did not assess the format of the different iron supplements, nor the specific side-effects for each format. Also, accuracy of responses to sensitive items, such as smoking and income, may be suspect. In addition, as study was performed in four hospitals, more centers and participants need to be involved to further estimate the prevalence of iron deficiency among pregnant women in Taif city, Saudi Arabia.

Conclusion

The prevalence of iron supplements use during pregnancy among pregnant women in Taif city was very high. However, nearly half of the participants reported compliance to iron supplements. The noncompliance was due to adverse effects of the iron. Prevalence of anemia among pregnant woman was found to be low and most cases of iron deficiency in pregnancy were diagnosed in the second and third trimester. There is need to encourage pregnant women to visit early for antenatal care and they should check hemoglobin level at first visit. Iron sulfate was the most used supplement reported by participants in Taif. As per our understanding, the strategies to reduce anemia during pregnancy should be iron and folic acid supplements, dietary intake preferences, diagnosis and continuous follow up of pregnant women. The current study intended to enhance the public perception about iron supplements during pregnancy.

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