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## Knowledge, Attitudes and Practices of Pregnant Women Regarding Iron Deficiency Anemia, Sana'a-Yemen

Nabil Ahmed Al-Rabeei<sup>1</sup>; Shatha Arsalan Al-Khuleidy<sup>1</sup>, Amat ullateif Yahia Abo taleb<sup>2</sup>, and Siham Mansour Ghalb<sup>1</sup>

<sup>1</sup>Community health and Nutrition, Faculty of Medicine and Health Sciences, Al-Razi University, Yemen,

<sup>2</sup>Community Medicine Department, Faculty of Medicine and Health Sciences, Sana'a University, Yemen.

### Abstract:

**Background:** The leading cause of anemia worldwide is iron deficiency, which is responsible for about half of all cases of anemia during pregnancy, and an estimated 38% of pregnant women in developed countries have deficiency of iron.

**Aim:** To assess iron deficiency anemia -related knowledge, attitude and practices among pregnant women visiting health centers in Sana'a city, Yemen. **Methods:** A KAP study was conducted from September 2021 to February 2022. A sample size of 226 pregnant women was enrolled in this study. A multi-stage randomized procedure was used to select the study population. Demographic variables, knowledge, attitudes and practices related to iron deficiency anemia were collected. Data were analyzed with SPSS version 21. The association between the variables was measured using a chi-square test. P-value <0.05 was considered significant. **Results:** The results of the study showed that the majority of pregnant women were 37.2% older than 29 years. Most of them (38.9%) had a secondary education. The majority (80.1%) housewives and (89.9%) from rural areas. The majority (92.9%) had low knowledge of iron deficiency anemia (IDA) and the majority (86.7%) had low practices. Only (49.3%) had a positive attitude about IDA. There was no significant association between age, place of residence and overall level of knowledge (p-value>0.05), while there was a significant association between education, occupation and overall level of knowledge (p-value<0.05). Furthermore, there was no significant association between demographic characteristics and overall level of practices (p-value <0.05). **Conclusions:** The knowledge and practical of pregnant women about IDA was low, but it was found that the attitude was better. Increase awareness should be applied in iron-rich diet.

**Keywords:** Knowledge; Attitude; Practices; ADA; Yemen.

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### Address for Correspondence:

Dr. Nabil Ahmed Al-Rabeei: Community health and Nutrition, Faculty of Medicine and Health Sciences, Al-Razi, University, Yemen, **E-mail:** [nabilalrabeei@hotmail.com](mailto:nabilalrabeei@hotmail.com)

## Introduction

IDA or low haemoglobin levels in pregnant women are regarded a high danger for both mother and newborn. The need for iron increases dramatically throughout pregnancy as the pregnancy progresses. Iron deficiency is estimated to be the most prevalent cause of anemia, accounting for 75 percent to 95 percent of cases. Anemia affects over two billion people worldwide, with over 40 million of them being pregnant women<sup>1</sup>.

According to World Health Organization (WHO), the global prevalence of anemia during pregnancy is 41.8 percent, with 95 percent of cases occurring in developing countries and among the poor segments<sup>2</sup>. Iron deficiency is the leading cause of anemia worldwide and is common in women of childbearing age, where this deficiency can lead to birth defects, premature labor, low birth weight, and increased prenatal deaths<sup>3</sup>. Women with IDA frequently report exhaustion, low energy, and poor mental concentration, whereas severe anemia is linked to low birth weight and preterm birth<sup>4,5</sup>. IDA was linked to a number of maternal outcomes, including placental insufficiency and an increased risk of postpartum hemorrhage, which was a primary cause of maternal death. Pregnancy with IDA can put both the mother and the infant into a high-risk category; thus, women should be aware of the risks and take preventative measures<sup>6</sup>. The motivation behind this study is to highlight the importance of IDA and their expected negative effects on pregnancy.

## Amis of the study

The study aimed to assess IDA-related knowledge, attitude and practices among pregnant women visiting health centers in Sana'a city, Yemen.

## Material and Methods

### Study setting

This study was conducted at eight health centers in Sana'a city. The health centers were providing primary care for pregnant women and children.

### Study design

A KAP study was performed to assess the knowledge, attitude and practices regarding IDA among pregnant women attended health centers in Sana'a City-Yemen, from September 2021 to February 2022.

### Population of the study

All pregnant women who attended to health centers in Sana'a city were invited to participant in the study. The

inclusion criteria were pregnant women who attended to health centers in Sana'a city for treatment or follow-up and agree to participate in the study. The exclusion criteria were all pregnant women who did not fulfill the above inclusion criteria. 226 pregnant women attended were admitted to this study.

### Sample size determination

The sample size was calculated using the Epi-Info program, and considered the following parameters: Population size= 999999, expected frequency was 82.2%<sup>7</sup>, acceptable margin of error=5%, design effect= 1 and cluster=1. The final sample size with 95% confident interval was 226 pregnant women.

### Sampling Methods

Multistage random sampling was conducted on 10 districts in Sana'a city. The first stage sampling was chosen randomly 4 districts out of 10. The second stage sampling was chosen randomly 2 health centers from each selected district. Then, the third stage sampling was chosen studied population from the selected health centers by convenience sampling to obtain a sample size of 226 pregnant women.

### Data Collection method and Tool

Data were collected as a face-to-face interview with pregnant women using the Food and Agriculture Organization (FAO) survey questionnaire for assessing nutrition-related knowledge, attitudes and practices which covered the following: The first section, developed by the researchers, was related to demographic characteristics. The information included: Age, educational level, occupation and residence. The second section was the knowledge, attitude, and practice developed by FAO<sup>8</sup> and the list of iron-rich foods was adapted from the FAO<sup>9</sup>. It contains 20 multiple-choice questions wherein nine questions measure knowledge, 5 measure practice, and 6 measure attitudes. The information included: knowledge questions were consisted of general signs of IDA, consequences of IDA for infants and young children, consequences of IDA for pregnant women, causes of IDA, prevention IDA, iron rich foods-easily absorbed, iron rich drinks-easily absorbed and foods that increase iron absorption. Practices questions were consisted of food-intake practices, consumption of vitamin-C-rich fruits and consumption of coffee/tea and attitudes towards a health or nutrition-related problem questions were consisted of IDA, attitudes towards an ideal or desired nutrition-related practice and attitudes towards food preference. The piloted of the Arabic questionnaire was administered before the study as a pretest to determine the weaknesses in

wording, translation to Arabic, predict response rate, and determine the time needed to fill the questionnaire. A pilot study was doing in the study setting on 10% of participants. The piloted participants were excluded from the final study sample.

### Data analysis

All collected data were entered and analyzed used the statistical package for social sciences (SPSS), version 21. Descriptive analysis was done using frequency and proportion for categorical variables and the mean and standard deviation of quantitative variables. Chi-square test was done to find out association between demographic characteristics and knowledge, attitude and practices. The overall level of knowledge was categories into: (low level from: 0-15 scores, moderate: 16-24 and high: 25-33). The overall level of practice was categories into: (low level from: 0-10 scores, moderate: 11-19 and high: 20-28). The attitude

regarding IDA was category into (positive and negative attitude).  $P$  -value  $<0.05$  was considered statistically significant.

### Ethical Consideration

This study was approved by the College of Medical Sciences at Al-Razi University, Yemen. Letters were sent to health centers manager to permit to conduct the study and oral consent was obtained from the participants.

## Results

### Demographic characteristics of pregnant women

Table 1 shows more than one third (37.2%) of pregnant women had  $>29$  years, (38.9%) of them had secondary education, while (80.1%) housewives, and (89.9%) from rural area.

**Table 1. Demographic characteristics of pregnant women**

Demographic characteristics	F	%
Age		
• 16-20	29	12.8
• 21-24	37	16.4
• 25-29	76	33.6
• $> 29$	84	37.2
Education		
• Illiterate	25	11.1
• Basic education	58	25.7
• Secondary education	88	38.9
• BSc. and above	55	24.3
Occupation		
• Employee	45	19.9
• Housewives	181	80.1
Residence		
• Urban	23	10.2
• Rural	203	89.8

### Level of knowledge of pregnant women about IDA

#### • General knowledge about IDA

About half (50.4%) of pregnant women knew that the signs of IDA are paleness/pallor, (36.3%) knew less energy/weakness. (62.4%) knew that delayed physical development was a consequence of IDA in infants and young children. While (43.8%) of them knew the difficulty of delivery is consequences of IDA for pregnant women. Less than two-thirds (64.2%) knew that IDA was caused by iron deficiency in the diet/eating too

little and not eating too much. (58.8%) knew that eating iron-rich foods is a method to prevent IDA. More details in Table 2.

#### • Iron rich foods

The result of the study showed that less than two-thirds (64.6%) of pregnant women knew that eating organ meat (liver) is easy to obtain foods rich in iron. (63.7%) do not know that orange increases iron absorption, while (78.8%) do not know that coffee decreases iron absorption. More details in Table 3.

**Table 2. Level of general knowledge of pregnant women about IDA**

Questions	Knows		Doesn't know	
	F	%	F	%
<b>Signs and symptoms of IDA</b>				
• Less energy/weakness	82	36.3	143	63.3
• Paleness/pallor	114	50.4	112	49.6
• Spoon nails/bent nails	38	16.8	188	83.2
• More likely to become sick	37	16.4	189	83.6
<b>Consequences of IDA for infants and young children</b>				
• Delay of mental development	48	21.2	178	78.8
• Delay of physical development	141	62.4	85	37.6
<b>Consequences of IDA for pregnant women</b>				
• Risk of dying during or after pregnancy	67	29.6	159	70.4
• Difficult delivery	99	43.8	127	56.2
<b>Causes of IDA</b>				
• Lack of iron in the diet/eat too little, not much	145	64.2	81	35.8
• Sickness/infection	25	11.1	201	88.9
• Heavy bleeding during menstruation	82	36.3	144	63.7
<b>Prevention of IDA</b>				
• Eat iron-rich foods/having a diet rich in iron	133	58.8	93	41.2
• Eat vitamin-C-rich foods during or right after meals	44	19.5	182	80.5
• Take iron supplements if prescribed	58	25.7	168	74.3
• Treat other causes of anaemia	53	23.5	173	76.5
• Continue breastfeeding (for infants 6–23 months old)	5	2.2	221	97.8

**Table 3. Level of knowledge of pregnant women about iron rich foods and absorption**

Iron rich foods– easily absorbed*	Knows		Doesn't know	
	F	%	F	%
<b>Organ meat</b>				
• Liver	146	64.6	80	35.4
• Kidney	19	8.4	207	91.6
• Heart	19	8.4	207	91.6
<b>Flesh meat</b>				
• Beef	66	29.2	160	70.8
• Goat	49	21.7	177	78.3
• Rabbit	7	3.1	219	96.9
• Chicken	20	8.8	206	91.2
• Duck	4	1.8	222	98.2
<b>Fish and seafood</b>				
• Fresh fish	127	56.2	99	43.8
• Dried fish	22	9.7	204	90.3
• Canned fish	22	9.7	204	90.3
• Shrimps	26	11.5	200	88.5
<b>Foods increase iron absorption</b>				
• Orange	82	36.3	144	63.7
• Lemons	80	35.4	146	64.6
<b>Foods that decrease iron absorption</b>				
• Coffee	48	21.2	178	78.8
• Tea	191	84.5	35	15.5

More than one option allowed\*

### Overall level of knowledge among pregnant women about IDA

The results of the study showed that the majority of the of pregnant women 210 (92.9%) had low knowledge about IDA, 15 (6.6%) had moderate knowledge and only 1(0.4%) had high knowledge about IDA. Figure 1.

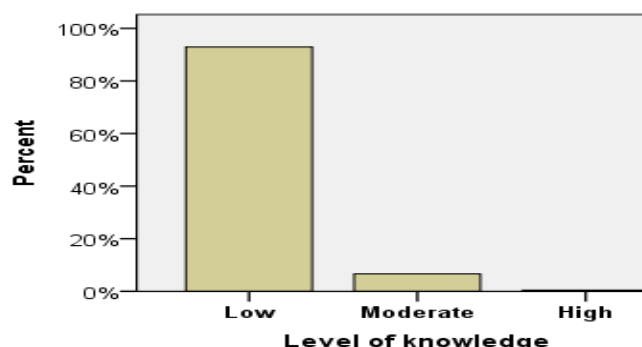


Figure 1. Overall level of knowledge among pregnant women about IDA

### Level of practices of pregnant women toward IDA

Regarding food-intake practices, table 4 shows that the majority (71.2%) of pregnant women did not ate liver organs, (82.7%) kidney organs and (92.5%) heart organs yesterday, day and night. For meat consumption, the majority (75.1%) ate beef, (87.1%) did not eat goat and (87.2%) did not eat rabbit, (93.4%) did not eat rabbit (87.2%) did not eat chicken and (57.5%) no duck, day and night yesterday. Regarding to fish and seafood-intake practices, only (40.3%) of the pregnant women ate fresh fish, while (77.9%) did not eat dried fish and (92.4%) did not eat canned fish (86.7%) they did not eat shrimp (87.2%) did not eat chicken and (96%) did not eat shellfish either day or night yesterday. The majority (77.4%) consumed the fresh citrus fruits or drank the juice made with them (orange, lemons), while (22.6%) did not consume the fresh citrus, or drink juice. Finally, almost (68.4%) drank coffee/tea with meals.

Table 4. Level of practices of pregnant women about IDA

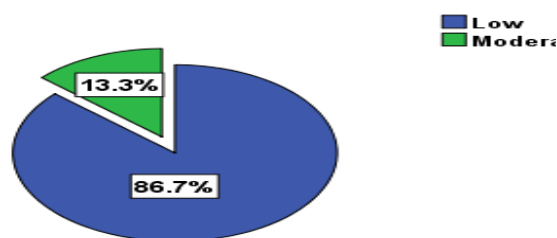
Questions*	Yes		No	
	F	%	F	%
<b>Organ meat -intake yesterday</b>				
• Liver	65	28.8	161	71.2
• Kidney	39	17.3	187	82.7
• Heart	17	7.5	209	92.5
<b>Flesh meat-intake yesterday</b>				
• Beef	169	75.1	56	24.9
• Goat	29	12.9	196	87.1
• Rabbit	29	12.8	197	87.2
• Chicken	15	6.6	211	93.4
• Duck	130	57.5	96	42.5
<b>Fish/seafood-intake yesterday</b>				
• Fresh fish	91	40.3	135	59.7
• Dried fish	50	22.1	176	77.9
• Canned fish	17	7.6	208	92.4
• Shrimps	30	13.3	196	86.7
• Seafood	9	4.0	217	96.0
<b>Consumption of vitamin-C-rich fruits</b>	175	77.4	51	22.6
<b>Drink of coffee/tea with meals</b>	154	68.4	71	31.6

More than one option allowed\*

### Overall level of practices among pregnant women about IDA

The results of the study showed that the majority of the of pregnant women 196 (86.7%) had low practices

about IDA and 30 (13.3%) had moderate practices about IDA. Figure 2.



**Figure 2. Overall level of practices among pregnant women about IDA**

### Attitudes towards IDA

Distribution the level of attitudes of pregnant women about IDA, shown in Table 5. Study results showed that only (36.3%) of pregnant women were likely to have a positive attitude towards perceived susceptibility. 64.7% had a positive attitude towards perceived severity and the majority (76.5%) had a positive attitude towards perceived benefit. Approximately (35.7%) had a positive attitude towards perceived barriers, (42.9%) had a positive attitude towards self-confidence and (49.7%) had a positive towards a similar food preference.

**Table 5. Level of attitudes of pregnant women about IDA**

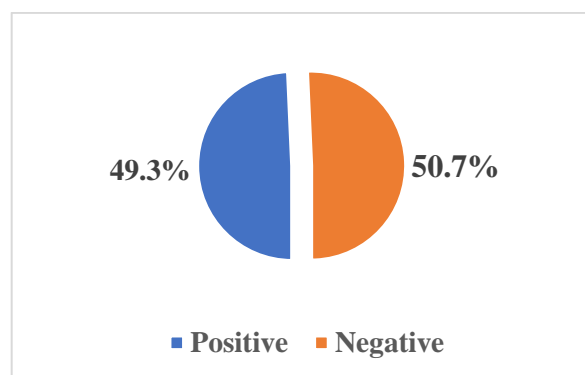
Items	Response*	
	F	%
<b>Health or nutrition-related problem</b>		
<i>Perceived susceptibility</i>		
• Not likely	61	28.3
• You're not sure	80	35.4
• Likely	82	36.3
<i>Perceived severity</i>	223	100
• Not serious	18	8.1
• You're not sure	60	27.1
• Serious	143	64.7
<b>An ideal or desired nutrition-related practice</b>		
<i>Perceived benefits</i>		
• Not good	19	8.8
• You're not sure	32	14.7
• Good	166	76.5
<i>Perceived barriers</i>		
• Not difficult	80	35.7
• So-so	111	49.6
• Difficult	33	14.7
<i>Self-confidence</i>		
• Not confident	35	15.8
• Ok/so-so	91	41.2
• Confident	95	42.9
<b>Food preference</b>		
• Dislike	44	19.7
• You're not sure	68	30.5
• Like	111	49.7

### Overall level of attitude among pregnant women about IDA

As regards to the overall level of attitude among pregnant women about IDA, the results of the study showed that the more than half of pregnant women (50.7%) had negative attitude about IDA and less than

half (49.3%) had positive attitude about IDA. Figure 3.





**Figure 3. Overall level of attitude among pregnant women about IDA**

**Association between demographic characteristics and overall level of knowledge**

As regard to the association between demographic characteristics and overall level of knowledge among pregnant women, the findings of the study showed that, there was no significant association between age, residency and overall level of knowledge ( $p$ -value  $>0.05$ ) while there was significant association between education, occupation and overall level of knowledge ( $p$ -value  $<0.05$ ). Table 6

**Table 6. Association between demographic characteristics and overall level of knowledge**

Demographic characteristics		Overall level of knowledge						P-value
		Low		Moderate		High		
		F	%	F	%	F	%	
Age (Year)	16-20	29	12.8	0	0.0	0	0.0	0.313
	21-24	35	15.5	2	0.9	0	0.0	
	25-29	68	30.1	7	3.1	1	0.4	
	> 29	78	34.5	6	2.7	0	0.0	
Education	Illiterate	23	10.2	2	0.9	0	0.0	0.003
	Primary education	58	25.7	0	0.0	0	0.0	
	Secondary education	84	37.2	3	1.3	1	0.4	
	B.Sc. and above	45	19.9	10	4.4	0	0.0	
Occupation	Employee	37	16.4	8	3.5	0	0.0	0.009
	Housewives	173	76.5	7	3.1	1	0.4	
Residence	Urban	23	10.2	0	0.0	0	0.0	0.168
	Rural	187	82.7	15	6.6	1	0.4	

**Association between demographic characteristics and overall level of practices**

As regard to the association between demographic characteristics and overall level of practices, the

findings of the study showed that, there was no significant association between demographic characteristics and overall level of practices ( $p$ -value  $>0.05$ ). Table 7.

**Table 7. Association between demographic characteristics and overall level of practice**

Demographic characteristics		Overall level of practice				P-value
		Low		Moderate		
		F	%	F	%	
Age (Year)	16-20	22	9.7	7	3.1	0.158
	21-24	35	15.5	2	0.9	
	25-29	65	28.8	11	4.9	
	> 29	74	32.7	10	4.4	
Education	Illiterate	24	10.6	1	0.4	0.467
	Primary education	51	22.6	7	3.1	
	Secondary education	74	32.7	14	6.2	
	BSc. and above	47	20.8	8	3.5	
Occupation	Employee	37	16.4	8	3.5	0.320
	Housewives	159	70.4	22	9.7	
Residence	Urban	22	9.7	1	0.4	0.183
	Rural	174	77.0	29	12.8	

## Discussion

IDA is a global health problem, ranking in the top 20 disability-adjusted causes of loss of life, ahead of tuberculosis<sup>10</sup>. It is one of the main causes of morbidity in women of childbearing age, but little is known about the knowledge, attitudes and practices regarding the detection and management of IDA. This study provides information on the knowledge, attitudes and practices of IDA in pregnant women attending primary health centers in the Tabuk area. Based on Alflah et al.<sup>11</sup>, the risk of IDA increased with pregnancy, the reduced birth interval, gestational age, the consumption of tea and coffee after meals, as well as a reduced protein intake and a low knowledge. Alghamdi<sup>12</sup> recommended increasing efforts in educational interventions for women of childbearing age regarding preconception counseling and adequate sources of iron-rich foods, iron and folic acid supplementation, and early detection and treatment of IDA during pregnancy period.

The results of the present study revealed that the knowledge related to cause of anaemia most had knew poor nutrition, and low had known sickness/infection (malaria, hookworm infection, HIV/AIDS) and bleeding during menstruation as cause for IDA. In a similar study in Palestine<sup>13</sup>, improper diet included not eating a balanced diet high in protein, not consuming iron-rich foods such as fish, chicken, beef, pork, beans, and not consuming iron supplements or treating malaria causes of iron deficiency. This may be because Knowledge of symptoms associated with IDA was also rated as low and this is evident from the finding of pregnant women who reported that IDA was associated with the following symptoms: less energy/weakness, paleness/pallor, spoon nails/bent nails (koilonychia) and more likely to get sick, 36.3%, 50.4%, 16.8% and 16.4%, respectively, according to our study, pregnant women knew most of the signs and symptoms that were observed in the IDA and the symptoms of IDA are related, this was not comparable to the study carried out in Palestine<sup>13</sup> unless its difference in its frequency and percentage is due to the difference in the sample size.

These results are consistent with study done by Sonkar et al.<sup>17</sup>, who suggested that study participants lacked knowledge about IDA. Furthermore, Tashara et al.<sup>18</sup> found that women of childbearing age have insufficient knowledge of IDA and its prevention. Therefore, sensitizing pregnant women by implementing a health education program on an iron-rich diet, the importance of regular iron supplements,

the cause of IDA is not a difference for any kind of pregnant mothers, fifty-six participants said "I don't know" in response, but in our study, it may be due to the difference in area study and the difference in the sample size.

However, other studies showed that only 3% of mothers were iron deficient as a cause of anemia<sup>7</sup>. While a similar study showed that malaria is the main cause of anemia. In other studies, more than half (68.1%) showed that dietary iron deficiency was the cause of anemia<sup>14</sup>. Similar results were found in a study conducted by Serbesa and Iffa<sup>15</sup> toward the awareness about the cause of IDA. Most of pregnant mothers knew that poor diet, bleeding during pregnancy, and multiple pregnancies are the causes of IDA. Another study in Nablus District, Palestine that the majority of participants (53%) were aware of correctly identified prevention and treatment options for IDA anemia<sup>7</sup>.

A study done in Tanzania by Margwe<sup>16</sup> showed generally, the respondents with secondary education (38%) and those of higher level of education had higher level of knowledge about IDA. A few participants did not know how to prevent or treat IDA (n=30, 17%)

Approximately 69.7% indicated that eating foods rich in iron could prevent IDA, but most of them (53%) were not aware of foods that inhibit iron absorption which is higher than in our study, due to difference in study area and level of education.

and complications of IDA during pregnancy will prevent or at least reduce the incidence of IDA and thus maternal mortality<sup>19</sup>. These results are also in agreement with at least four other studies. First, Ghimire and Pandey<sup>20</sup>, who found that mothers did not have enough knowledge about IDA prevention and ferrous food sources. Second, Ibrahim et al.<sup>21</sup>, who pointed out that the studied pregnant women had insufficient knowledge of IDA prior to the intervention based on the health beliefs model, which is below the average. Third, Shanthini and Nivedita<sup>22</sup>, who pointed out the lack of knowledge about IDA, foods rich in iron and the importance of iron supplementation during pregnancy. Fourth, Balasubramanian et al.<sup>19</sup> who found that prenatal mothers had a lack of knowledge about IDA and its complications. In contrast, Theng et al.<sup>23</sup> found that the high level of knowledge about the consumption of iron supplements among pregnant women in Kuala Terengganu is due to the fact that pregnant women have a higher level of education.



The current study shows that more than half of pregnant women had a negative attitude towards IDA and less than half had a positive attitude. This finding was not in line with Margwe<sup>17</sup>, who found that 38% of the women surveyed had negative attitudes towards IDA, this incongruity between the current study and previous study could be attributed to social and cultural differences. Angadi et al.,<sup>24</sup> had documented low attitudes towards IDA in adolescent girls in Karnataka. Furthermore, Jalambo et al.,<sup>13</sup> found that most of the pregnant women have negative attitude and practices about IDA. On the contrary, Shahzad et al.<sup>25</sup> had documented that more than half of their studied subjects had good knowledge about IDA and more than threequarters of them had positive attitude towards self-awareness of IDA as a disease. Those studies in line with our study findings. Furthermore, previously mentioned study by Ahamed et al.<sup>26</sup> found that about four fifth of the studied women had positive attitude toward IDA. This conflict of results is due to social, cultural and educational differences between the subjects.

Regarding feeding for the prevention of IDA, the present study showed poor knowledge among the women examined. This result was confirmed by the study of Enrera et al.<sup>27</sup> who found that pregnant women need iron supplements to prevent IDA from occurring. Furthermore, a study by Raksha and Shameem<sup>28</sup> in Mangalore, India, found poor practices in most women of childbearing age. Furthermore, Okube et al.<sup>29</sup> documented that special attention should be paid to pregnant women during the pregnancy to prevent IDA. To prevent IDA, nutritional education on the consumption of more varied and additional meals and foods rich in iron, as well as iron/ aluminum foil supplementation is recommended.

A study by Alghamdi et al.<sup>12</sup> documented that there was a poor practice of IDA in pregnant women. Furthermore, Sivapriya and Parida<sup>30</sup> found that 59.5% of prenatal women followed good practices to prevent IDA during pregnancy. A study conducted in Ethiopia<sup>31</sup> like the current study found that only 31.5% of women would not drink tea or coffee with meals, while 71% of them would have fruit juices, which is similar to our study.

## Conclusion

Most pregnant women had little knowledge of IDA, most pregnant women had poor practices with IDA, and approximately half of pregnant women had negative attitudes toward IDA.

## Recommendations

Sensitize women, their families and communities by strengthening health education on the prevention of IDA during follow-up care of prenatal care and creating materials that describe symptoms, risk factors and conditions. Ways to prevent IDA, and increase positive attitude toward IDA of pregnant women and study to examine the prevalence and association risk factors of IDA among pregnant women in Yemen.

## Conflict of interests

The authors declare that no competing interests.

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