Original article
Ginecol Obstet Mex 2024; 92 (1): 8-15.

https://doi.org/10.24245/gom.v92i1.9347

Level of knowledge and adherence to treatment in patients with gestational anemia.

Nivel de conocimiento y adhesión al tratamiento de pacientes con anemia gestacional

Lucero Esmeralda Pacheco Troyes,[1] Yuly Raquel Santos Rosales,[2] Karen Elizabeth Campos Correa[3]

Abstract

OBJECTIVE: To determine the relationship between the level of knowledge and adherence to the prescribed regimen of ferrous sulfate and folic acid to prevent or treat gestational anemia in patients attended at a public hospital in Peru.

MATERIAL AND METHODS: The study was observational and descriptive, a cross-sectional, prospective case series, carried out between February and April, 2022. The population was made up of patients in the immediate puerperium, with a diagnosis of gestational anemia, established two months prior to the end of the pregnancy. The patients' knowledge was evaluated through a questionnaire, and adherence was evaluated through the Morisky-Green-Levine test; both instruments were validated and reliable. The statistical analysis was made with the STATA software; Pearson's chi squared, and the generalized linear model of the Poisson family were used, with a robust variance and confidence interval of 95%.

RESULTS: Two hundred and seventeen patients were studied; 2 out of 10 had a diagnosis of gestational anemia, and were following the treatment. Overall, 71.89% of the participants had an adequate knowledge of the importance of the ferrous sulfate and folic acid treatment, and 23.96% had an intermediate level of knowledge. The correlation between level of knowledge and adherence was near statistical significance (p = 0.05 RPa: 1.63; CI 95%: 0.99-2.71), established by an adjusted analysis. Knowledge of the importance of the antianemic treatment for the mother multiplied threefold the adherence prevalence (p = 0.04; RPa: 3.17; CI 95%: 1.04-9.72).

CONCLUSION: Knowledge about the importance of the antianemic treatment, on the part of the mothers, significantly increased adherence to the treatment.

KEYWORDS: Ferrous sulfate; Folic acid; Anemia; Pregnancy; Postpartum; Peru; Prevalence.

Resumen

OBJETIVO: Determinar la relación entre el nivel de conocimiento y la adhesión al régimen prescrito de sulfato ferroso y ácido fólico para prevenir o tratar la anemia gestacional en pacientes atendidas en un hospital público del Perú.

MATERIAL Y MÉTODOS: Estudio observacional, descriptivo, de serie de casos, transversal y prospectivo llevado a cabo entre febrero y abril de 2022 en pacientes en el puerperio inmediato con diagnóstico de anemia gestacional establecido dos meses antes del término del embarazo. Se evaluaron los conocimientos mediante un cuestionario y la adhesión mediante la prueba de Morisky-Green-Levine, ambos instrumentos validados y fiables. El análisis estadístico se procesó en el programa STATA; se utilizaron χ^2 de Pearson y el modelo lineal generalizado de la familia de Poisson con varianza robusta y nivel de confianza del 95%.

[1] Degree in Obstetrics, Universidad Nacional Mayor de San Marcos, Peru
[2] PhD in Education Sciences, Professor at the Universidad Nacional Mayor de San Marcos. Peru.
[3] Degree in Obstetrics, Professor at the Universidad Nacional Mayor de San Marcos, Peru.

ORCID
https://orcid.org/0000-0002-3479-0181
https://orcid.org/0000-0002-4536-8293
https://orcid.org/0000-0001-6664-2557

Received: October 2023

Accepted: November 2023

Correspondence
Karen Elizabeth Campos Correa
elicampos87@gmail.com

This article should be cited as: Pacheco-Troyes L, Santos-Rosales YR, Campos-Correa KE. Level of knowledge and adherence to treatment in patients with gestational anemia. Ginecol Obstet Mex 2024; 92 (1): 8-15.

RESULTADOS: Se estudiaron 217 pacientes; 2 de cada 10 tenían diagnóstico de anemia gestacional y cumplían el tratamiento. En conjunto, el 71.89% de las participantes tenía un conocimiento adecuado de la importancia del tratamiento con sulfato ferroso y ácido fólico, y el 23.96% alcanzó un nivel intermedio. La relación entre el nivel de conocimientos y el apego se aproximó a la significación estadística (p = 0.05 RPa:1.63; IC95%: 0.99-2.71), establecida mediante análisis ajustado. El conocimiento de la importancia del tratamiento antianémico para la madre multiplicó por tres la prevalencia de la adherencia (p = 0.04; RPa: 3.17; IC95%: 1.04-9.72).

CONCLUSIÓN: El conocimiento por parte de las madres de la importancia del tratamiento antianémico aumentó significativamente la adherencia.

PALABRAS CLAVE: Sulfato ferroso; ácido fólico; anemia; embarazo; posparto; Perú; prevalencia.

BACKGROUND

Gestational anemia caused by iron and folic acid deficiency is still a global public health challenge due to the high rates of maternal and perinatal morbidity and mortality.[1] This is associated with late fetal death, premature birth or low weight newborn, need for blood transfusion, infections, among other problems.[2] Anemia affects 41.8% of pregnant women,[3] and their adherence to timely supplementation is relevant because there is an increase in the metabolic demand caused by the physiological changes in gestation.[4] The WHO recommends that all pregnant women receive 60 mg of elemental iron, and in cases of anemia they should receive 120 mg of iron daily, plus folic acid. When the adherence to this recommendation is low, i.e. when the dosage, frequency and duration of the prescribed scheme is not followed, anemia is worsened.[4,5] Anemia is reported in 25.3% of pregnant women in Peru, in the Demographic and Family Health Survey (ENDES by its Spanish initials) , with a similar frequency in urban and rural zones,[6] despite the accessibility to health services and universal health care.

The proportion of pregnant women with low level of knowledge about the importance of receiving iron supplementation is high, and the adherence to the posology is equally low.[7-10] There is an association between an insufficient level of knowledge, especially knowledge about the side effects and their omission, and the lack of adherence.[1,11-13] The WHO makes reference to 5 factors that affect adherence to the prescription, among them 1) socioeconomic, 2) patient-related, 3) disease-related, 4) treatment-related, and 5) health care-related.[14] They all require strategies with an holistic approach during prenatal care, and a reflexive disposition towards the factors involved.

In this context, the evaluation of knowledge and adhesion to the treatment of anemia has allowed for the identification of gaps that will help in the design of educational programs that strengthen and have an impact on adherence to the daily intake of ferrous sulfate and folic acid. The goal of the study was to determine the relationship between the level of knowledge and the adherence to the prescribed treatment of ferrous sulfate and folic acid to prevent or treat gestational anemia in patients seen in a public hospital in Peru.

MATERIALS AND METHODS

The study was an observational, descriptive, cross-sectional, prospective case series study, carried out between February and April 2022,

with patients in the immediate puerperium, with diagnosis of gestational anemia, established two months prior to the end of the pregnancy. The patients gave birth at the *Hospital Nacional Sergio Bernales* (HNSEB) in Lima, Peru. The inclusion criteria were: patients in the immediate puerperium with gestational anemia diagnosis (hemoglobin under 11 g/dL)[15] established one, to two months prior to the end of the pregnancy, whether it was a vaginal birth or a C-section, following a ferrous sulfate and folic acid treatment. The exclusion criteria were patients with severe anemia, multiple pregnancy, mental disorders, medical complications, or patients referred to another health care institution.

Characteristics: age (years), civil status (single, married, cohabitant, widow, or divorced), degree of education (no education, primary, secondary, higher non-university, and higher university), occupation (homemaker, dependent, and independent), weeks of gestation, previous pregnancies, living children, prenatal care, and history of ferrous sulfate treatment (yes or no).

The level of knowledge of the patients was evaluated through a questionnaire made up of 11 questions related to the treatment of gestational anemia with ferrous sulfate and folic acid. For each correct answer one point was given, and for each incorrect answer 0 points were given. The final score was classified in three levels: high (8 to 11 points), medium (5 to 7 points), and low (0 to 4 points). The validity of the instrument was verified by 5 obstetrics specialists, who had post-graduate degrees in Public Health, and were knowledgeable on the study's field, obtaining a global concordance of 0.96. The reliability of the questionnaire was verified by running a pilot with 15 participants that obtained a 0.71 Kuder-Richardson coefficient, thus the instrument was deemed valid and reliable.

The adherence to treatment was evaluated with the Morisky-Green-Levine test,[16] validated by Val Jiménez. A patient was considered to adhere to the treatment when the 4 questions were answered "NO", otherwise, the patient was considered no to adhere to the treatment.[17]

Permission was requested to the management of the *Hospital Nacional Sergio Bernales* to carry out the study. Participants who met the inclusion criteria were recruited on a daily basis, and they were invited to participate through the informed consent format. The questionnaire was handed out to be answered anonymously, the data was gathered in Excel, and the statistical software STATA 16 was used for the analysis.

The relationship between level of knowledge and adherence to treatment was evaluated through Pearson's chi squared test. To compare the age variable between the groups with and without adherence, a t of Student test for independent samples was used, after verifying its normal distribution. To calculate the raw and adjusted prevalence ratios (rPR and aPR) with their confidence intervals, a generalized linear model of Poisson was used, with robust variance. The confidence interval was of 95% (CI 95%), and a value of $p < 0.05$ was considered significant.

The research was approved by the Committee of Ethics of the *Hospital Nacional Sergio Bernales* (N°0004-2022), in compliance with the declaration of Helsinki and the bioethical principles of research in humans, which include the informed consent and assent.[18] To guarantee the confidentiality of the participants, no personal data was collected.

RESULTS

Two hundred and seventeen patients with diagnosis of gestational anemia, with a mean age of 26.79 years (SD ±6.82) were studied. Among the relevant findings, only 2 out of 10 patients with diagnosis of gestational anemia adhered to the antianemic treatment.

https://doi.org/10.24245/gom.v92i1.9347

In the analysis of the general characteristics, patients who had a history of anemia treatment showed to adhere less to the current prescription in comparison to the ones who didn't have such history (p = 0.02). **Table 1**

Regarding the knowledge about the treatment with ferrous sulfate and folic acid, 71.89% of the patients had a high level. The incorrect answers were related to the definition of iron and the value of hemoglobin for a diagnosis of anemia. **Tables 2 and 3**

In the global analysis of the relation between the level of knowledge and adherence to treatment, adjusted for the variable "history of anemia treatment", it was close to statistical significance with p = 0.056. **Table 4**

In the analysis of each question, in the questionnaire of knowledge, it was found that when "the importance of the treatment for the mother is recognized", the prevalence of adherence to treatment is tripled, in comparison to those who didn't identify its importance (aPR: 3.17, CI 95%: 1.04-9.72). **Table 5**

DISCUSSION

Gestational anemia is a public health problem with negative repercussions in the health of mother and child. It was found that the frequency of adherence to treatment in the patients of the study was 23.9%. When comparing international research, in different contexts, such as Ethiopia, adherence was greater, even in healthy pregnant women, reaching percentages between 40 and 63%.[12,19] Regarding this, Siekmans et al.,[20] analyzed the barriers that hindered compliance to the prescription of ferrous sulfate and folic acid. They found that the associated factors in developing countries were poor counseling about the intake of these supplements, and a lack of quality-health-care.

In the global analysis we didn't find an association between the level of knowledge and adhesion to the treatment with ferrous sulfate and folic acid, however, in the detailed analysis, it was evident that knowing about the importance of the prescription was associated, significantly, with better compliance. With respect to this finding, Sendeku et al.,[5] reported that a good knowledge of the supplementation, increased threefold the probabilities of adherence. Likewise, receiving counselling about the health benefits of iron and folic acid, increased adherence to treatment in 2.62 times. Desta and his team[1] showed that the patients who received information about the supplements, had a greater probability of full adherence to the prescription. Saputri et al.,[21] in Indonesia, found an association between the level of knowledge and adherence to the intake of ferrous sulfate (OR = 6.05, CI 95%: 1.79-20.51). These findings show that the lack of adherence is originated in the lack of understanding and insufficient knowledge about the consequences of anemia in pregnancy. Thus, it is essential to provide information and sensibilization about preventive care, and recovery during, and after birth.

The research reported here had limitations because of the cross-sectional design, given that it was not possible to establish relations of cause and effect between the variables. The measurement of adherence to treatment was made indirectly through the Morisky-Green-Levine test; we suggest further evaluation of adherence through other techniques, such as pill count or quantifying serum iron.

CONCLUSIONS

The knowledge about the importance of the prescription of antianemic treatment to pregnant women was related very significantly to the adherence of the supplementation of ferrous sulfate and folic acid. Without a doubt, more multicenter studies are needed, with a higher representation

Table 1. General characteristics regarding adherence to treatment with ferrous sulfate and folic acid during pregnancy

Characteristics	Total		Adherence				
			Yes (52)		No (165)		p†
	n	%	n	%	n	%	
Age *(mean; SD) years*	(26.79; 6.82)		(27.03; 6.86)		(26.71; 6.82)		0.76*
Civil status							
Single	37	17.05	6	11.54	31	18.79	0.32
Married	13	5.99	2	3.85	11	6.67	
Cohabitant	167	76.96	44	84.62	123	74.55	
Degree of education							
No education	2	0.92	0	0.00	2	1.21	0.39
Primary	54	24.88	17	32.69	37	22.42	
Secondary	146	67.28	31	59.62	115	69.70	
Non-university superior	8	3.69	3	5.77	5	3.03	
University superior	7	3.23	1	1.92	6	3.64	
Occupation							
Homemaker	138	63.59	36	69.23	102	61.82	0.60
Dependent	13	5.99	3	5.77	10	6.06	
Independent	66	30.41	13	25.00	53	32.12	
Gestational age *(mean; SD) weeks*	*(38.81; 1.22)*		*(38.63; 1.29)*		*(38.86; 1.19)*		0.24*
Pregnancies							
1	83	38.25	19	36.54	64	38.79	0.64
2	67	30.88	19	36.54	48	29.09	
3	42	19.35	9	17.31	33	20.00	
4	16	7.37	2	3.85	14	8.48	
5 or more	9	4.15	3	5.77	6	3.64	
Number of children							
1	106	48.85	25	48.08	81	49.09	0.33
2	61	28.11	18	34.62	43	29.06	
3	35	16.13	5	9.62	30	18.18	
4	11	5.07	2	3.85	9	5.45	
5 or more	4	1.84	2	3.85	2	1.21	
Number of prenatal care consultations *(mean; SD)*	*(6.64; 1.99)*		*(6.59; 1.73)*		*(6.65; 2.07)*		0.85*
History of treatment with ferrous sulfate							
Yes	59	27.19	8	15.38	51	30.91	0.02
No	158	72.81	44	84.62	114	69.09	
Total	217	100.00	52	100.00	165	100.00	

† Pearson's chi squared, * t of Student for independent samples, SD: standard deviation.

https://doi.org/10.24245/gom.v92i1.9347

Table 2. Level of knowledge about the treatment with ferrous sulfate and folic acid due to anemia during pregnancy

Level of knowledge	n	%
Low	9	4,15
Medium	52	23,96
High	156	71,89
Total	**217**	**100,00**

of the Peruvian population, which analyze other variables that influence adherence to treatment, in prenatal care, sociocultural aspects, and family participation. It will also be relevant to carry out studies of educational interventions, and of follow-up, both in-person and remote, to improve adherence to the prescription of iron and folic acid during pregnancy and postpartum.

Table 3. Frequency of correct answers regarding the knowledge of the treatment with ferrous sulfate and folic acid

Items	Correct answers	
	n	%
Why is the treatment important for your child?	197	90,78
How does the treatment work on your body?	184	84,79
What is anemia?	183	84,33
Why is the treatment important for the mother?	182	83,87
What drinks should you take your medication with?	177	81,57
How many tablets of folic acid and ferrous sulfate should you take every day?	174	80,18
What adverse effects might the medication cause?	172	79,26
What time of day should you take your medication?	171	78,80
What is ferrous sulfate?	158	72,81
¿What hemoglobin value (g/dL) is considered anemia?	80	36,87
¿What is iron?	70	32,26
Total	217	100,00

Table 4. Level of knowledge and adherence to treatment with ferrous sulfate and folic acid due to anemia during pregnancy

Level of knowledge	Adherence				Raw analysis		Adjusted analysis	
	Yes		No		p	rPR CI	p	aPR CI
	n	%	n	%				
Low	0	0.00	9	5.50				
Medium	11	21.20	41	24.80	0.07[a]	1.55 [0.95-2.54]	0.05[b]	1.63 [0.99-2.71]
High	41	78.80	115	69.70				
Total	52	100.00	165	100.00				

[a] Pearson's squared χ^2 test.
[b] Poisson's regression test.
rPR: raw prevalence ratio; aPR: adjusted prevalence ratio; CI: confidence interval.
Results adjusted to the variable: *History of anemia treatment with ferrous sulfate.*

Table 5. Questions about knowledge and adherence to treatment with ferrous sulfate and folic acid due to anemia during pregnancy

Knowledge	Adherence				Raw analysis		Adjusted analysis	
	Yes		No		p	rPR CI 95%	p	aPR CI 95%
	n	%	n	%				
What is anemia?								
Correct	48	92.3	135	81.8	0.10[a]	2,29 [0,85-5,79]	0,08[b]	2,28 [0,89-5,85]
Incorrect	4	7.7	30	18.2	*Ref.*		Ref.	
Hemoglobin value (gr/dL) to identify anemia								
Correct	24	46.2	56	33.9	0.11[a]	1,47 [0,92-2,35]	0,14[b]	1,42 [0,88-2,29]
Incorrect	28	53.8	109	66.1	*Ref.*		Ref.	
What is iron?								
Correct	19	36.5	51	30.9	0.44[a]	1,21 [0,74-1,97]	0,38[b]	1,24 [0,76-2,01]
Incorrect	33	63.5	114	69.1	*Ref.*		Ref.	
What is ferrous sulfate?								
Correct	38	73.1	120	72.7	0.96[a]	1,01 [0,59-1,73]	0,83[b]	1,06 [0,62-1,80]
Incorrect	14	26.9	45	27.3	*Ref.*		Ref.	
How many tablets of folic acid and ferrous sulfate should you take every day?								
Correct	45	86.5	129	78.2	0.21[a]	1,58 [0,76-3,28]	0,18[b]	1,64 [0,79-3,37]
Incorrect	7	13.5	36	21.8	*Ref.*		Ref.	
What time of day should you take your medications for anemia?								
Correct	45	86.5	126	76.4	0.14[a]	1,73 [0,83-3,58]	0,151[b]	1,68 [0,83-3,45]
Incorrect	7	13.5	39	23.6	*Ref.*		Ref.	
What adverse effects might the medication cause?								
Correct	45	86.5	17	23.1	0.16[a]	1,68 [0,81-3,48]	0,077[b]	1,91 [0,93-3,92]
Incorrect	7	13.5	38	76.9	*Ref.*		Ref.	
What drinks should you take your medications with?								
Correct	44	84.6	133	80.6	0.52[a]	1.24 [0.63-2.43]	0.601[b]	1.19 [0.61-2.33]
Incorrect	8	15.4	32	19.4	*Ref.*		Ref.	
Why is the treatment important for the mother?								
Correct	49	94.2	133	80.6	0.04[a]	3.14 [1.03-9.54]	**0.043[b]**	**3.17 [1.04-9.72]**
Incorrect	3	5.8	32	19.4	*Ref.*		Ref.	
Why is the treatment important for your child?								
Correct	50	96.2	147	89.1	0.17[a]	2.54 [0.66-9.69]	0.161[b]	2.57 [0.68-9.65]
Incorrect	2	3.8	18	10.9	*Ref.*		Ref.	
How does the treatment work on your body?								
Correct	48	92.3	136	82.4	0.11[a]	2.15 [0.83-5.58]	0.131[b]	2.11 [0.80-5.54]
Incorrect	4	7.7	29	17.6	*Ref.*		*Ref.*	
Total	52	100.0	165	100.0				

[a] Pearson's χ^2

[b] Generalized linear model of Poisson's family with robust variance; rPR: raw prevalence ratio; aPR: adjusted prevalence ratio; CI: confidence interval; Ref.: reference category.

https://doi.org/10.24245/gom.v92i1.9347

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