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ORIGINALES

Sociodemographic and prenatal factors associated with anemia in Peruvian pregnant women

Factores sociodemográficos y prenatales asociados a la anemia en gestantes peruanas

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ABSTRACT:

Objective: To determine the association between sociodemographic and prenatal factors with anemia in Peruvian pregnant women.
Method: Secondary analysis of the ENDES 2017 sample. The sample consisted of pregnant women between 15 and 49 years old. The dependent variable was iron deficiency anemia and the independent variables were sociodemographic and prenatal factors. For the bivariate analysis. prevalence ratio was calculated.
Results: Regarding sociodemographic factors and anemia, pregnant women with a higher educational level have less possibility of presenting anemia (PR: 0,91; 95% CI: 0,42-1,96; p = 0,041). On the other hand, among the obstetric and prenatal factors associated with anemia were: initiate prenatal control in the third month (PR: 1,4; 95% CI: 0,74-1,58, p = 0,03) and be found in the second trimester of pregnancy (PR: 1,35, 95% CI: 0,74-1,58; p = 0,04). While pregnant women who have more children (PR: 0,87; 95% CI: 0,78-0,97; p = 0,02) are less likely to have anemia.
Conclusion: The higher educational level and having more children are protective factors of anemia. The start of prenatal control from the third month and the second trimester of pregnancy were associated with the presence of anemia in pregnant women.

Keys words: Anemia; pregnant women; prenatal education.

RESUMEN:

Objetivo: Determinar la asociación entre los factores sociodemográficos y prenatales con la anemia en gestantes peruanas.
Método: Análisis secundario de la muestra ENDES 2017. La muestra fue de 639 gestantes entre 15 a 49 años. La variable dependiente fue la anemia ferropénica y las variables independientes fueron los factores sociodemográficos y prenatales. Para el análisis bivariado se calculó la Razón de prevalencia.

Resultados: Respecto a los factores sociodemográficos y la anemia, las gestantes con un nivel educativo superior tienen menos posibilidad de presentar anemia (PR: 0,91; IC 95%: 0,42-1.96; p= 0,041). Por otro lado, entre los factores obstétricos y prenatales asociados a la anemia fueron: iniciar el control prenatal en el tercer mes (PR: 1,4; IC 95%: 0,74-1,58; p= 0,03) y encontrarse en el segundo trimestre de embarazo (PR: 1,35; IC 95%: 0,74-1,58; p= 0,04). Mientras que las gestantes que tienen más hijos (PR: 0,87; IC 95%: 0,78-0,97; p= 0,02) tienen menos posibilidad de presentar anemia.
Conclusión: El nivel educativo superior y tener más hijos son factores protectores de la anemia. El inicio de control prenatal a partir del tercer mes y el segundo trimestre de gestación se asociaron con la presencia de anemia en las gestantes.

Palabras clave: Anemia; mujeres embarazadas; educación prenatal

INTRODUCTION

Anemia in pregnant women, considered as a blood hemoglobin (Hb) concentration lower than 110 g / l, is one of the most important public health problems [(1)]. The World Health Organization (WHO) reports that 56,4 million pregnant women have anemia worldwide [(2)]. The highest prevalence of this pathology occurred in Africa and Southeast Asia, that is, in developing countries [(3)]. The prevalence of anemia in pregnant women in 2016 in Latin America and the Caribbean was 29,5% [(4)] and in Peru it was 25,8% [(5)]. With respect to the provinces of Peru, Huancavelica and Puno registered 45,5% and 42,8% respectively [(5)].

During pregnancy, anemia has a significant impact on both the health of the fetus and the mother. Consequently, premature rupture of membranes, premature birth, oligohydramnios, susceptibility to develop infections, hemorrhages, etc [(6,7)]. As for the newborn, it conditions the appearance of cardiovascular diseases in his adult life [(8)], In addition, an anemic pregnant woman who presents with obstetric hemorrhage and puerperal infection has a higher probability of death in relation to those who do not present this pathology [(9,10)].

Taking into account that anemia in pregnant women can be prevented, there are certain factors that constitute this pathology. Among them are not attending regularly or going too late to their prenatal check-ups [(11,12)]; have lower levels of education [(10,11,13)], which lead to ignorance of care before and during pregnancy [(12)]; being a primiparous mother [(11,14)] and being in the second trimester of pregnancy [(15,16)],

In consideration of the above, anemia in pregnant women is one of the causes of maternal-fetal death [(17)] so it is important to know the factors to prevent it. For this reason, the objective of this study was to determine the relationship of sociodemographic, obstetric and prenatal factors to anemia in pregnant women according to the *Encuesta Demográfica y de Salud Familiar* (ENDES) 2017.

METHOD

Study of quantitative, non-experimental and analytical approach. A secondary analysis of the database of the *Encuesta Demográfica y de Salud Familiar 2017* (ENDES 2017) was carried out. The ENDES was done by the *Instituto Nacional de Estadística e Informática* (INEI) [(11)] to obtain data that may have a national representativeness. The sample design was two-stage through conglomerates and homes.

The effective sample consisted of 639 women between 15 - 49 years. Only women who are between the first to the ninth month of their pregnancy and who have been able to answer the obstetric and prenatal questions were included.

The main variable was anemia, defined as the concentration of hemoglobin less than 11 g / dl in pregnant women [18]. It was categorized into iron-deficiency anemia (less than 11 g / dl) and did not present anemia (greater than or equal to 11 g / dl). For the measurement of this variable, the Hemocue® instrument (an instantaneous and reliable photometric method) was used as well as being adjusted by the subject's altitude applying the formula of *Pediatric Nutrition Surveillance System* (CDC / PNSS) and *Dirren* [19].

For the measurement of sociodemographic variables, age in years, quantitative variable; natural region, (metropolitan Lima, rest of coast, mountain and jungle); educational level, qualitative polytomous variable (without education, primary, secondary and higher); residence, dichotomous qualitative variable (urban and rural); quintile of wealth defined in relation to wealth in the households surveyed, was taken into account. Instead of income, the wealth quintile depends on the availability of goods and services as well as the characteristics of the dwellings. It is an ordinal qualitative variable (upper quintile, fourth quintile, quintile intermediate, second quintile and lower quintile) [20] and marital status: single, married, cohabiting and others. Regarding the obstetric and prenatal variables were: number of children, quantitative variable; gestational age, qualitative polytomous variable (first trimester, second trimester and third trimester); beginning of prenatal control, qualitative polytomous variable (1st month, 2nd month, third month to more) and number of controls, quantitative variable.

For the statistical analysis of the study, the statistical package Stata version 14 was used. Descriptive statistical analysis was performed obtaining frequency and percentages for the qualitative variables and averages and standard deviation for the quantitative variables. In the inferential analysis we used the normality and variance test of the quantitative variables to be able to use the correct statistical analysis when they intersect with other variables. The *Student's T* test and the Chi-square statistical test were performed. In the unadjusted bivariate analysis, Poisson regression was used with the robust variance estimate, calculating the crude prevalence ratio (PR) [21] and 95% confidence intervals. All these analyzes had a statistical significance less than 0,05. Regarding the ethical aspects, ENDES is a public access database in which women were surveyed with verbal consent.

RESULTS

Of the total of 639 pregnant women, the average age was 27 years, 49,1% had a secondary education level, 31,9% belonged to a lower quintile and 67,4% were cohabiting. In addition, of the total number of respondents, the mean number of children was 2,11, 40,4% started their control after the third month, 44,9% were found in the second trimester of pregnancy, 76,3% had anemia and 23,6 did not present the same (see table 1).

Table 1. Description of the sample

	n	%
Sociodemographic factors		
Age (mean ± SD)	27,9 ± 6,04	
Natural region		
Metropolitan Lima	66	9,82
Rest of coast	218	32,44
Mountain range	200	29,76
Jungle	188	27,98
Education level		
Without education	17	2,53
Primary	143	21,28
High school	330	49,11
Higher	182	27,08
Residence		
Urban	474	70,54
Rural	198	29,46
Wealth Index		
Lower quintile	215	31,99
Second quintile	166	24,70
Quintile intermediate	142	21,13
Fourth quintile	92	13,69
Upper quintile	57	8,48
Civil status		
Cohabiting	453	67,41
Married	175	26,04
Single	11	1,64
Others	33	4,91
Obstetric and prenatal factors		
Number of children (mean ± SD)	2,11 ± 1,47	
Start of control		
1st month	184	27,54
2nd month	214	32,04
3rd to more	270	40,42
Number of controls (mean ± SD)	9,33 ± 7,41	
Gestational age		
1st trimester	152	22,62
2nd trimester	302	44,94
3rd trimester	218	32,44
Anemia		
No	488	76,37
Yes	151	23,63

Note: Standard deviation (SD).

In table 2, both in the descriptive bivariate analysis and the unadjusted (crude) model, the sociodemographic factor associated with anemia was the educational level (p = 0,041). That is, pregnant women with a higher educational level are less likely to have anemia compared to those without education (PR: 0,91, 95% CI: 0,42-1,96). On the other hand, having fewer children (p = 0,02), starting prenatal control in the third month (p = 0,03) and being in the second trimester of pregnancy (p = 0,04) were associated with the presence of anemia. The rest of the associations were not significant, Regarding the analysis of the unadjusted (crude) model, the obstetric and prenatal factors associated with anemia were: the number of children (0,016), the start of prenatal control (p = 0,047) and gestational age (p = 0,024), Pregnant women with more children are less likely to have anemia compared to those with fewer children (PR: 0,87, 95% CI (0,42-1,96). On the other hand, pregnant women who initiate their control as of third month they have 1,48 times more chance of presenting anemia than those who started their control in the first month (PR: 1,4, 95% CI: 0,74-1,58). The second trimester of pregnancy is 1,35 times more likely to have anemia than those found in the first trimester (PR: 1,35, 95% CI: 0,74-1,58).

Table 2. Bivariate analysis between sociodemographic, obstetric and prenatal factors associated with anemia in Peruvian pregnant women, ENDES 2017

	Anemia				
	No n (%)	Yes n (%)	p	PR (95% CI) †	p
Sociodemographic factors					
Age (mean ± SD)	28,11 (6,15)	27,35 (5,77)	0,17*	0,98 (0,96-1,00)	0,165
Natural region			0,11		
Metropolitan Lima	43 (72,88)	16 (27,12)		Reference	-
Rest of coast	151 (72,95)	56 (27,05)		0,99 (0,62-1,60)	0, 992
Mountain range	160 (82,47)	34 (17,53)		0,64 (0,38-1,08)	0,099
Jungle	134 (74,86)	45 (25,14)		0,92 (0,56-1,51)	0,761
Education level			0,01		
Without education	12 (70,59)	5 (29,41)		Reference	-
Primary	115 (83,33)	23 (16,67)		0,56 (0,24-1,29)	0,178
High school	227 (72,99)	84 (27,01)		0,76 (0,34-0,17)	0,082
Higher	134 (77,46)	39 (22,54)		0,91 (0,42-1,96)	0,041
Residence			0,08		
Urban	332 (74,44)	114 (25,56)		Reference	-
Rural	156 (80,83)	37 (19,17)		0,75 (0,53-1,04)	0,088
Wealth Index			0,10		
Lower quintile	165 (79,71)	42 (20,29)		Reference	-
Second quintile	127 (78,88)	34 (21,12)		1,04 (0,69-1,55)	0,846
Quintile intermediate	96 (70,59)	40 (29,41)		1,44 (0,99-2,10)	0,058
Fourth quintile	57 (66,28)	29 (33,72)		1,66 (0,11-2,48)	0,078
Upper quintile	43 (87,76)	6 (12,24)		0,60 (0,27-1,33)	0,214
Civil status			0,47		
Cohabiting	333 (76,73)	101 (23,27)		Reference	-
Married	127 (77,91)	36 (22,09)		0,94 (0,67-1,32)	0,760
Single	7 (70,00)	3 (30,00)		1,28 (0,49-3,37)	0,605
Others	21 (65,63)	11 (34,38)		1,47 (0,88-2,45)	0,133

Obstetric and prenatal factors					
Number of children			0,02		
(mean ± SD)	2,20 (1,56)	1,88 (1,12)	*	0,87 (0,78-0,97)	0,016
Start of control			0,03		
1st month	131 (76,61)	40 (23,39)		Reference	-
2nd month	156 (76,85)	47 (23,15)		0,98 (0,68-1,43)	0,957
3rd month plus	197 (75,48)	64 (24,52)		1,48 (0,74-1,58)	0,047
Number of controls					
(mean ± SD)	9,44 (8,54)	8,96 (2,71)	0,50	0,99 (0,97-1,00)	0,215
Gestational age			0,04		
1st trimester	114 (79,17)	30 (20,83)		Reference	-
2nd trimester	213 (73,96)	75 (26,04)		1,35 (0,86-1,81)	0,024
3rd trimester	161 (77,78)	46 (22,22)		1,06 (0,70-1,61)	0,072

* From the Student's T test

† PR: Prevalence ratio, IC: Confidence interval. The calculations were made with the "Yes" category of the dependent variable.

DISCUSSION

In this study of the total of pregnant women, 23,6% presented anemia. In addition, the sociodemographic protective factor associated with anemia was the higher educational level. Regarding the obstetric-prenatal factors associated with anemia, the beginning of prenatal control was started from the third month and the second trimester of pregnancy. A protective factor was having more children.

In the present study it was evidenced that pregnant women with a higher educational level have less possibility of presenting anemia compared to those without education. Studies reported that low educational level and awareness of anemia also contributed to the increase of this pathology in pregnant women [10,13]. Women with a lack of education are generally of low socioeconomic class, therefore they do not have access to good maternal health services. Therefore, they are more prone to poor nutrition and other infections during pregnancy [10]. It should be noted that pregnant women who presented anemia before pregnancy, a condition that had to be treated previously, brings a series of complications both for the health of the fetus and the mother and even the death of both [10], due to lack of knowledge in preparing to have a future baby. Studies report that the key to reducing the prevalence of anemia is the educational and economic empowerment of women [13,22].

Another finding of the study was that pregnant women with more children have fewer times of presenting anemia compared to those with fewer children. Studies reported that primiparous women had anemia compared to multiparous women [14,23]. Although anemia in pregnancy is often related to the increase in parity due to repeated drainage of iron stores [22]. It usually happens that in primiparous women due to lack of knowledge, lack of prenatal care and not preparing for the birth of their baby (with the iron and folic acid supplement before getting pregnant) they have anemia and they get worse with the advance of the months of pregnancy [22,23]. Given the above, the socio - demographic profile of pregnant women in the study, most have a lower quintile and low educational levels, therefore pregnant women who have fewer children have not become aware of the importance of nutrition during pregnancy [24] and do not know that the healthy diet in relation to daily requirements is three main meals plus an

additional ration and consume supplements that provide vitamins and minerals orally [7, 25].

In the same way, pregnant women who are in the second trimester of pregnancy presented anemia, Studies report that anemia occurs in pregnant women as pregnancy progresses [10, 15]. Another study showed that in the second trimester of pregnancy (week sixteen) the hemoglobin levels were lower than 10,5 g / dl [16], since in this trimester of pregnancy the level of hemogline is decreased due to hemodilution by the increase in plasma volume by 45% to 50% for the needs of the uterus and growing fetus; an underlying maternal infection and untreated anemia in the first trimester of pregnancy.

Significantly, most pregnant women in the study began prenatal care after the third month, this is similar to reports from other studies [14, 15] where the prevalence of anemia was 4,08% in the first weeks of gestation and it increased as the pregnancy progressed to 16,32% [15]. Finally, in the United Arab Emirates, it was found that pregnant women who had fewer prenatal controls increased the risk of anemia [14]. In the prenatal controls, relevant information is extracted from the mother and from them nutritional counseling is provided, including vitamin and mineral supplements such as folic acid and iron, The growth and optimal development of the embryo or fetus is also controlled [25]. That is why, if the pregnant woman initiates her controls early and continues with the counseling in each trimester, she will reduce the risk of anemia and its complications [7].

Limitations

The study was limited to the secondary analysis of the ENDES 2017 database; that is, there was no control in the collection and processing of the variables for the analysis. For that reason, do not consider the interest on other study that could be considered in future studies with multivariate analysis considering medical history as urinary tract infections and family history in order to better address the phenomenon and its multiple causes. Regarding the strengths, this study was analyzed in a representative sample, since ENDES 2017 was carried out at a national level, and there are few studies that link anemia with databases at the national level.

CONCLUSIONS

In this study, 23,6% of pregnant women have anemia. Higher educational level and having more children are protective factors of anemia in pregnant women. The start of prenatal control from the third month and the second trimester of pregnancy was associated with the presence of anemia in pregnant women.

Recommendations

Nursing professionals are recommended to treat anemia in women as a priority and duty in continuous monitoring through training and multidisciplinary work. Therefore, it is necessary to educate the pregnant women about the importance of attending their prenatal check-ups regularly, motivate and encourage the supplemental consumption of iron and folic acid and healthy and balanced diets. Also, adequate follow-up during pregnancy, mainly in the second trimester to avoid complications. In the same way, nurses should make women aware of how to prepare for a pregnancy through the

early consumption of ferrous sulfate and folic acid, the control of the blood hemoglobin test, healthy diets, etc. in order to avoid not only the appearance of anemia during pregnancy but other infections and / or complications.

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