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Nutritional Status of Pregnant Women and Its Impact on the Evolution of Pregnancy in Bassila (North-west of Benin)

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Abstract

The purpose of this study is to evaluate the nutritional status of pregnant women attending antenatal care at the Bassila Zone Hospital. It is a prospective, descriptive and analytical study that took place from March 7 to May 21, 2019. All consenting pregnant women who accepted prenatal check-ups were included. Their weight and size were collected, blood samples were taken for Blood Count and Gout Thick/Parasite Density. They are subject to a series of questions relating to socio-demographic, obstetric, and nutritional characteristics. The data collected were analyzed using the Epi Info and Excel 2010 software. The probability values p <0.05 were considered statistically significant. The results of this study show that 350 pregnant women aged 16 to 45 were identified. 25% of pregnant women surveyed have a '' small size '' (T <1.55m). The prevalence of anemia is 67.7%. A predominance of moderate anemia is noted with 47.26% of cases followed by the mild form, 43.88% against 8.86% of severity. Normochromic normocytic anemia predominated with a rate of 62.44%. Cases of hypochromic microcytic anemia make 30.06%. The small "size" and anemia in pregnant women have a negative impact on the normal course of pregnancy. In addition, Pearson's correlation coefficient significance tests revealed a potentially statistically significant relationship between anemia, animal protein consumption, and kaolin consumption.

Keywords: *Pregnant Women, Small Size, Normochromic Normocytic Anemia, Kaolin, Benin*

Introduction

Nutritional status is the physiological state of an individual defined by the relationship between intake and nutrient requirements and the body's ability to digest, absorb and utilize these nutrients (INSAE/ICF, 2013). Indeed, the nutritional status of women aged 15 to 49 is one of the determinants of good pregnancy and their outcome. Its evaluation in pregnant women is based on anthropometric and biological evaluation. For example, anthropometric assessment relies heavily on the measurement of height <155 cm that can negatively affect pregnancy outcomes (J.G.B. Derraik *et al*, 2016); (L. Nikiema *et al* 2010). When performing biological evaluation, the hemoglobin rate can be used to determine anemia. The latter is a pathological state in which the number of red blood cells is insufficient to meet the physiological needs. For pregnant women, the threshold set by WHO is 11g / dl (WHO, 2011). According to WHO estimates, an estimated 1.62 billion people are anemic worldwide, with Africa and South-East Asia being the most affected by this scourge with high prevalence. It affects all age groups with a predominance in children under five and women of childbearing age. The causes and circumstances of anemia are multiple, the most important being nutritional deficiencies, parasitic infections and chronic infections, and also obstetric factors (K. Kalenga *et al*., 2003). Recent studies indicate that the prevalence of anemia among pregnant women remains high in Benin. Some authors have reported prevalence of 57% in Abomey-Calavi (A.A. Adébo *et al*., 2019), and 75.7% in Ouidah (K.G. Koura *et al*., 2011) in southern Benin. What about northern municipalities like bassila?

Materials and Methods

1.1 Type and study population

It was a prospective, descriptive and analytical study that took place from March 7 to May 21, 2019. The study

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population consisted of pregnant women received in consultation in the said period at the Bassila Zone Hospital in the Donga Department (Figure 1)

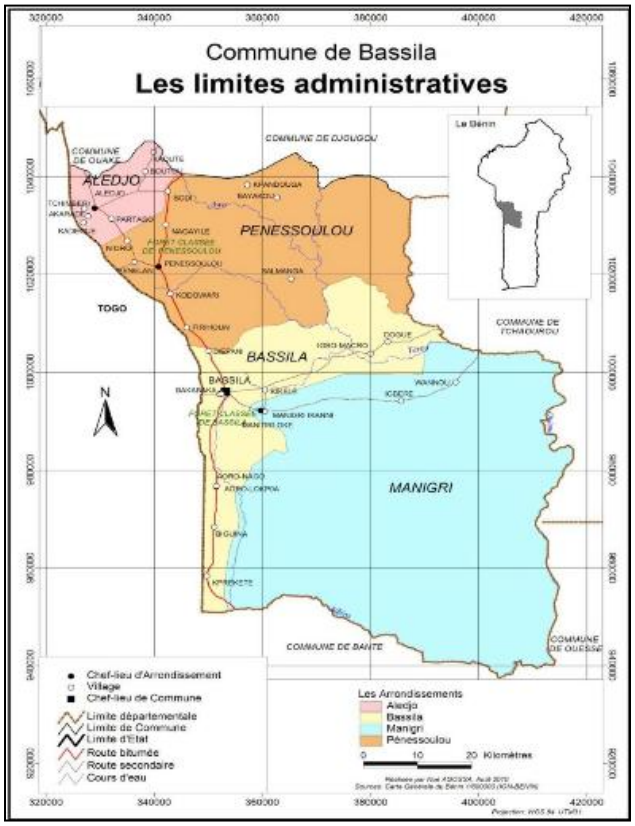

Figure1: Cartography of the municipality of Bassila (I.Y.M. ALASSANI, 2012)

1.2 Inclusion Criteria / Exclusion Criteria

● *Inclusion criteria*

We included pregnant women who received antenatal care consenting and who agreed to perform antenatal check-ups at the CHU Z Ab / SA laboratory or at least the NFS and the GE / DP.

● *Exclusion criteria*

All non-consenting women to participate in our study and those who performed their assessment outside the CHU Z were excluded.

1.3 Sample size

The minimum sample size was calculated according to the Schwartz formula (S.H.Schwartz,1994) considering p = 68%, prevalence of anemia in pregnant women in Benin (INSAE/ICF, 2019).

1.4 Methodology

● *Materials*

After obtaining the consent of the pregnant women, anthropometric measurements (weight and height) were taken. The weight was measured using a 150 kg scale 150 kg precision weighing scales of the Little Balance type, and the height measurement was performed using a SECA brand vertical 0.1 cm accuracy. Pregnant women were subjected to a series of questionnaires on socio-demographic characteristics (age, occupation, educational level, marital status), food and obstetric characteristics (gestational age, parity, gestational age). Then, blood samples were taken for the following biological tests: Blood Formula and Throat Drop / Parasite Density.

● *Laboratory analyzes*

➢ *Blood Formula Count*

It was used the impedance variation principle where a suspension of blood in a conductive diluent causes a drop in electrical conductivity, the voltage drop is proportional to the size of the cell and these pulses are counted. Which allowed to have figured elements of blood (red blood cells, leucocytes and thrombocytes), hemoglobin rate as well as calculation of a hematocrit, and establishment of a leukocyte formula.

➢ *Thick Gout / Parasite Density*

For Plasmodium falciparum research, we performed the technique of Thick Drop / Parasitic Density. This is done in two stages: the deposition of two drops of blood, one for the confession of the blood smear and the other used for the thick drop according to the basic technique for the microscopic diagnosis of malaria (WHO, 2014).

• *Data analysis*

The sizes of women pregnant collected were divided into two categories; those with a size <1.55m characterizing the "small size" and those with a height> 1.55m characterizing the normal size (J.G.B. Derraik *et al*, 2016)
Anemia was defined as hemoglobin strictly below 11g / dl in pregnant women (WHO, 2011). So

• For an Hb level <11g / dl: anemic gestates;
• For an Hb level> 11g / dl: pregnant not anemic.

Depending on the degree of severity, we have distinguished:

• Light anemia: hemoglobin level between 9 g / dl and 11g / dl.
• Moderate anemia: Hb included 7 g / dl and 9 g / dl.
• Severe anemia: Hemoglobin level below 7g / dl.

Moreover, on the basis of the other erythrocyte constants allowing to classify the anemia we distinguished according to the French Society of Hematology (SFH, 2010):

**• normocytic anemia for normal VGM between 80fl-98fl
• microcytic anemia for a VGM less than 80%

• Macrocytic anemia for VGM greater than 98%
• Hypochromia was defined by an MCHC of less than 32 g / dl and normochromia by an MCHC of 32-36 g / dl.

1.5 Statistical Analysis

The various data collected were entered and analyzed using Microsoft Office Word, Excel and Epi info software. The quantitative data were submitted to Excel to bring out the descriptive statistics. The Chi2 test of the same software was used to test the hypothesis of association between the assumed risk factors and the disease state. The threshold of significance has been set at 5% for all analyzes

1.6 Ethical considerations

The investigation was carried out after obtaining authorization from the officials of the Bassila Zone Hospital under the memo N ° 111/2019 / MS / DDS-D / ZSB / HZ-Bla / SAAE of the 6 March 2019. The validation of the research protocol and the survey questionnaire by the competent authorities of the structures concerned was made. Each pregnant woman should approve the process before being included. The data was analyzed anonymously.

Results

A total of 350 pregnant women with an average age of 27.56 ± 6.33 and extremities ranging from 16 to 45 years were recorded. Information on the socio-demographic , obstetrical, nutritional and medical characteristics of the study population is given in tables 1,2,3 and 4. The results on the nutritional status of pregnant women reveal that 25% of the pregnant women had a small size (T <155cm). Furthermore, 67.7% are anemic with 43.88% of mild cases against 47.26% of moderate and 8.86% of severe cases. Normochromic normocytic anemia predominates in the population with 62.44% cases. However, microcytosis and hypochromia are present at 30.06%. With regard to macrocytosis, 6.75% of cases were recorded. No statistically significant association was found between sociodemographic, medical, obstetric factors and the occurrence of anemia in our population. However, we note a close and significant relationship between anemia and dietary factors such as: consumption of animal protein and kaolin.

Table1: Sociodemographic characteristics of the study population

Sociodemographic characteristics	Anemia n= 237	67,7%	No anemia n =113	32,3%	P value
Age					
< 18 years	09	03,8%	03	02,7%	0,7
18- 35 years	204	86,1%	96	84,9%	
> 35 years	24	10,1%	14	12,4%	
Profession					
Craftmen	46	19,4%	24	21,2%	
Tadesmen	52	21,9%	35	31%	
Students	1	0,4%	1	0,9%	0,18
Households	110	06,8%	4	03,5%	
Officials	16	46,4%	40	35,4%	
Others	12	05,1%	9	08%	
Education level					
no	117	49,4%	54	47,8%	
Primary	69	29,1%	34	30,1%	0,96
Secondary	43	18,14%	20	17,7%	
University	8	3,4%	5	04,4%	
Marital status					
Singles	54	22,8%	28	24,8%	0,68
Married	183	77,2%	85	75,2%	

Table 2: Obstetrical characteristics of the study population

Obstetrical characteristics	Anemia n= 237	67,7%	No anemia n =113	32,3%	P value
Amount gesture					
			18	15,9%	
-first gesture	42	17,8%	26	23%	0,8
-second gesture	45	18,9%	33	29,2%	
-multi gesture	67	28,3%	36	31,9%	
-big multi gesture	83	35%			

Parity					
nulliparous	47	19,9%	21	18,6%	0,26
primiparous	52	21,9%	27	23,9%	
multiparous	116	48,9%	47	41,6%	
	22	9,3 %	18	15,9%	
Gestationnal age					
➢ < 15 SA	16	6,8%	11	9,7%	0,3
➢ 16 - 28 SA	47	19,8%	24,8%	74	65,5%
➢ > 28 SA	174	73,4%			

Table3: Foods characteristics of the study population

Foods characteristics	Anemia		No anemia		P value
	n= 237	67,7%	n =113	32,3%	
Supplémentation in fer/folâtres					
➢ yes	215	90,7%	105	92,9%	0,78
➢ No	22	9,3%	08	7,1%	
Fruit/vegetable consumption					
➢ Normal	43	18,1%	25	22,1%	0,67
➢ Moderate	169	71,3%	76	67,3%	
➢ bad	25	10,6%	10,6 %		
Coffee consumption					
➢ yes	24	10,13	17	15,04%	0,18
➢ No	213	89,87	96	84,96%	
Kaolin consumption					
➢ Normal	14	5,90	1	0,88%	
➢ Moderate	60	25,32	28	24,78%	0,03*
➢ bad	163	68,78	84	74,34%	
Animals protein consumption					
➢ Normal	154	64,98	87	76,99%	0,02*
➢ Moderate	72	30,38	26	23,01%	
➢ bad	11	04,64	00		

*p< 0,05

Table4: Medicals characteristics of the study population

Medicals characteristics	Anemia		No anemia		P value
	n= 237	67,7%	n =113	32,3%	
Malaria					
➢ Positive	15	93,67%	06	5,31%	0,7
➢ Négative	222	6,33%	107	94,69%	
Deworming					
➢ yes	118	49,79%	66	58,41%	0,13
➢ No	119	50,21%	47	41,59%	
Use protection against malaria					
➢ yes	141	59,49	64	56,64	
➢ No	96	40,51	49	43,36	0,61

Discussion

This study reveals that 25% of pregnant women have a '' small size '' (size <1.55m). This result is similar to that obtained at the Abomey-Calavi University Hospital Center (28%) in the south of the country (A. A. Adébo *et al*, 2019). This statural state is partly an indicator of a chronic nutritional deficit during childhood and can have negative repercussions on the normal course of pregnancy as pointed out by (J.G.B. Derraik *et al*, 2016). This chronic process is most often accompanied by a multi-micronutrient deficiency that is difficult to catch up (L. Nikiéma *et al*., 2010). In addition, 68% of pregnant women recruited had anemia. This prevalence is close to those obtained in other studies conducted in Benin where the authors found 67.97% in Allada (M. Accombessi,

2010) and 65.7% in Ouidah (K.G. Koura *et al*., 2011). This rate is in line with that obtained at the national level following the Demographic Health Survey in Benin (INSAE/ICF, 2019). On the other hand, it is higher than those obtained in some large cities in southern Benin: Porto-Novo is 48% (M. Makoutode *et al*, 2004) and Abomey-Calavi is 57% (A.A. Adébo *et al*, 2019). The difference could be explained by the socio-economic characteristics of each area surveyed. From the etiology point of view, normochromic normocytic anemia was the most common (62.44%). Indeed, pregnancy leads to profound physiological changes. As a result, from the 2nd trimester, the hemoglobin level can be decreased without there being anemia; it is an increase in plasma volume without elevated blood volume, due to hemodilution usually observed during pregnancy. It is physiological anemia of pregnancy. Iron deficiency, a lack of hemoglobin synthesis in erythroblasts or an inflammatory process could be evoked in the 30% of cases of hypochromic microcytic or normocytic anemia as pointed out by several authors (J. Barro *et al*, 2013 et A. Touré, 2012) in their studies. Indeed, iron, an essential element in the synthesis of hemoglobin, plays a determining role during pregnancy. Iron requirements increase as gestational age progresses. There are three stages of iron deficiency: the first is the stage of depletion of iron stores which has no functional consequences; the 2nd stage is when the reserves are exhausted and the tissues start to run out of iron, the situation leads to a deficiency. Thus, iron deficient individuals, despite not suffering directly from anemia, suffer from decreased physical capacity and decreased immunity; the 3rd stage is when the deficiency is severe, this final stage proves fatal. Also, 6.75% of pregnant women had macrocytic anemia; this could be attributed to deficiency in vitamin B9 and vitamin B12 as pointed out by (J.M. Scott 2007) in his study. The deficiency of these two vitamins has repercussions on the hormonal development of the embryo and the fetus during pregnancy. Also, it is not comfortable to note that there is a significant association between anemia and the consumption of Kaolin. In fact, kaolin, a natural clay substance, disrupts or even prevents the absorption of iron. This can lead to anemia sometimes very severe. In fact, the consumption of clay is a source of iron deficiency that can go as far as life-threatening maternal prognosis by postpartum haemorrhage on severe anemia. Moreover, in addition to the well-known effects of anemia on the risk of prematurity, the consumption of kaolin leads to overexposure to heavy metals, in particular aluminum, which is potentially harmful for the neural development of the child as underlined. Lambert *et al*. (2014) in their study.

Conclusion

The assessment of the nutritional status of pregnant women in the municipality of Bassila reveals that 25% of pregnant women are small and 68% are anemic. This situation could negatively affect the normal course of pregnancy in this population

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