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Nutritional Status of Pregnant Women and Neonatal Health in the Maternity Wards of the City of Parakou in Benin

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Abstract

Introduction: Few studies are interested to perinatal health in relation to the nutritional status of pregnant women in Sub-Saharan Africa. The objectives of this study were to determine the factors associated with newborn weight in the city of Parakou in 2017.

Methods: This was a descriptive and analytical prospective study conducted on 205 pregnant women and their newborns in the maternity wards of the city of Parakou from 1st July to 30th September, 2016. The authors have determined the Body Mass Index (BMI), the GWG, and the anthropometric profile of newborns. The Chi-square test and the prevalence ratios were used to compare the variables with the 0.05 p-value threshold.

Results: The prevalence of obese, overweight and lean pregnant women was respectively 9.8%, 21.5% and 9.3%. The proportions of pregnant women who had normal or high GWG were respectively 48.8% and 41.9%. Almost half the lean pregnant women (47.4%) had not reached a normal GWG. The prevalence of hypotrophic, normotrophic and hypertrophic newborns was respectively 7.8%, 27.8% and 64.4%. Newborn hypotrophy was associated with socio-economic well-being level (OR=21.1; p=0.000), BMI, GWG, and Physical Activity Level of pregnant women (p<0.05). Newborn hypertrophy was associated with obesity, excessive GWG, and low level of physical activity of pregnant women.

Conclusion: The nutritional status of the pregnant woman is associated with the weight of the newborn.

Keywords: Hypotrophy; Fetal macrosomia; Gestational weight gain; Nutritional status

Introduction

Low birth weight is associated with non-negligible perinatal morbidity risks and long-term high cardiovascular morbidity risk [1-3]. Thus, in recent years, some studies have shown that low birth weight is a predictive factor of delayed cognitive development, chronic disease development in adulthood [3]. There is a higher risk of cesarean delivery for low and high weight newborns compared to gestational age [1]. The Institute of Medicine revised its guidelines for gestational weight gain standards in 2009 [4]. Women with gestational weight gain (GWG) below the norm are at greater risk of giving birth to low weight newborns. In contrast, women with high GWG are at greater risk of giving birth to macrosomic or high weight newborn relative to gestational age [5]. Few studies in the literature are interested in neonatal health in relation to the nutritional status of the pregnant in Africa South of the Sahara. The objectives of this work were to evaluate the nutritional status of pregnant women and their newborns, and to determine the factors associated with the weight of newborns in the maternity wards of the city of Parakou in 2017.

Framework and Methods

We carried out a descriptive and analytical prospective study in the 7 public maternity hospitals and in the maternity ward of the departmental teaching hospital (CHUD) of the city of Parakou in northern Benin from 1st July to 30th September, 2016.

The study population consisted of pregnant women living in the city of Parakou, followed up during antenatal consultations (ANC) in the public maternity wards of this city and their newborns.

We included in this work pregnant women in the second or the third trimester of pregnancy who had come to ANC during the study period, who resided in Parakou during the survey period, who had a health card including their height and at least their weight in the first trimester of pregnancy and who had given birth in public maternity hospitals in this city during the study period.

We excluded the pregnant women who had refused to participate in the survey or whose weight in the first trimester of pregnancy had not been marked in their health card or who had been lost to follow-up during the survey.

We conducted a random convenience sampling of pregnant women who come to ANC in one of the public maternity wards in the city of Parakou.

The dependent variables were:

- The GWG determined by the difference between the weight of the pregnant woman at delivery and that recorded in the first trimester or before pregnancy. Recommended GWG intervals (kg) for the entire pregnancy based on Body Mass Index (BMI) were: 12.5-18 if BMI<18.5 (underweight), 11.5-16 if 18.5 ≤ BMI<25 (normal weight); 7-11.5 if 25 ≤ BMI <30 (overweight); 5-9 if BMI ≥ 30 (obesity) [5].
- In newborns, birth weights were classified using the intrauterine growth curves of Alihonou [6] which is a Beninese local reference curve for classifying newborns as hypotrophic (GA weight curve below the 10th percentile), normotrophic (GA weight curve between the 10th and the 90th percentile), and hypertrophic (GA weight curve above the 90th percentile) as defined by Clausson et al. [4].

The independent variables were: gestational age (GA), maternal Body Mass Index (BMI), physical activity level (PAL), social and economic well-being level (SEWL), obstetric characteristics (parity).

The GA was determined on the basis of the date of the last menstrual period when it was known or on the basis of the first trimester ultrasound. But when the GA was obtained by both methods, we used the age of the ultrasound for analysis. The mother's nutritional status was assessed in the first trimester of pregnancy by her Body Mass Index (BMI=Weight/height in square metres in kg/m^2). A BMI <18.5 means that the pregnant woman was lean; the BMI is normal when it is between ≥ 18.5 and <25; between ≥ 25 and <30 the BMI shows an overweight pregnant woman and the BMI ≥ 30 shows that the pregnant woman is obese [7].

Physical activity levels were classified into six categories according to Ambroise M. classification: Table 1 [8].

Categories	PAL (Physical Activity Level)	Activities
A	1	Sleep, nap, rest in lying position
B	1.5	Sitting: eating, TV, microcomputer, video games, board games, reading, writing, office work, sewing, transport
C	2.2	Standing: toilet, small displacement in the home, cooking, housework, laboratory work, selling, driving gears
D	3.0	Walking, gardening or equivalent, gymnastics, yoga
E	3.5	High intensity professional activities, plastering, auto repair
F	5	Sport, intense professional activities: earthmoving, forestry

Table 1: Classification of physical activity level.

Data were collected through individual interviews and health cards exploitation, using a survey sheet.

Treatment and analysis of the data

Double data entry was done using Epi Data 3.1 software. Univariate and multivariate analytical descriptive statistics were generated by the SPSS 21 software. The quantitative variables were expressed on average with standard deviation and the qualitative variables in percentage. In the univariate analysis, the Chi-square test the exact one of Fischer was used for the comparison of percentages. The strength and intensity of the association were estimated by the odd-ratio with a 95% confidence interval.

Ethical considerations

The consent of Borgou/Alibori Health Departmental Direction and the management team of the various maternity hospitals were obtained. All participants received detailed information about the study and gave their consent.

Results

Characteristics of pregnant women

A total of 205 pregnant women were included in the study. The pregnant women were aged 16 to 43 years with a mean age of 26.6 ± 5.4 years. Those aged 25-29 accounted for 30.7% of the sample. Over two thirds of the study populations were married women (88%). Half of the pregnant women (50.7%) had no education and 6.3% had a university degree. Seventy-five pregnant women (36.6%) had a high socio-economic well-being level.

The prevalence of obese, overweight, or lean pregnant women were respectively 9.8% (20/205), 21.5% (45/205), and 9.3% (19/205) (Table 2).

	Lean		Normal		Overweight		Obese		Total		p
	n=19	%	n=121	%	n=45	%	n=20	%	n	%	
Age (years)											**0.000**
15-19	5	27.8	11	61.1	1	5.6	1	5.6	18	100	

20-24	2	3.5	35	61.4	17	29.8	3	5.3	57	100	
25-29	7	11.1	45	71.4	8	12.7	3	4.8	63	100	
30-34	3	6	19	38	16	32	12	24	50	100	
≥35	2	11.8	11	64.7	3	17.6	1	5.9	17	100	
Parity											**0.000**
Nullipara	11	21.6	34	66.7	4	7.8	2	3.9	51	100	
Primipara	2	4.2	35	72.9	10	20.8	1	10.4	48	100	
Multipara	6	5.7	52	49.1	31	29.2	17	16	106	100	
SEWL*											**0.000**
Low	10	58.8	6	35.3	1	5.9	0	0	17	100	
Average	8	7	68	59.6	27	23.7	11	9.6	114	100	
High	1	1.4	47	63.5	17	23	9	12.2	74	100	
GWG**											**0.000**
Insufficient	9	47.4	8	42.1	0	0	2	10.5	19	100	
Normal	6	6	71	71	18	18	5	5	100	100	
Excessive	4	4.7	42	48.8	27	31.4	13	15.1	86	100	

*SEWL: Socio-Economic Well-being Level
**GWG: Gestational Weight Gain

Table 2: Distribution of pregnant women according to their age, socio-economic level, Gestational Weight Gain based on their nutritional status (N=205).

The proportions of pregnant women with normal or high GWG were respectively 48.8% (100/205) and 41.9% (86/205). GWG was significantly related to the nutritional status of pregnant women before pregnancy (p=0.000). Indeed a proportional increase of the GWG with the BMI of the pregnant women had been noted (Table 2).

Nutritional status of pregnant women

BMI was significantly associated with the pregnant women age (p=0.000), Socio-Economic Well-being Level (p=0.000), parity (p=0.009), GPG (p=0.000) (Table 2).

There were more cesarean in obese or overweight pregnant women than in normal weight pregnant women: 25%; 24.4% versus 7.4% (p=0.003) (Table 3).

	Vaginal delivery		**Caesarean**		**Total**		**p**
	n=178	**%**	**n=27**	**%**	**N**	**%**	
Nutritional status (N=205)							**0.003**
Obese	15	75.0	5	25.0	20	100.0	
Overweight	34	75.6	11	24.4	45	100.0	
Normal	112	92.6	9	7.4	121	100.0	
Lean	17	89.5	2	10.5	19	100.0	
GWG (N=205) *							**0.000**
Excessive	66	76.7	20	23.3	86	100.0	
Normal	93	93.0	7	7.0	100	100.0	
Insufficient	19	100	0	0.0	19	100.0	

*GWG : Gestational Weight Gain

Table 3: Distribution of pregnant women according to mode of delivery and nutritional characteristics.

State of newborns

The proportions of hypotrophic, normotrophic and hypertrophic newborns were respectively 7.8% (16/205), 27.8% (57/205) and 64.4% (132/205).

Newborn hypotrophy was associated with low levels of socio-economic well-being (p=0.000), low BMI of pregnant women (p=0.000), GWG (p=0.000), Physical Activity Level (p=0.000) and GA (p=0.000) (Table 4).

	Hypotrophic		**Normotrophic**				
	N=16	**%**	**N=57**	**%**	**OR**	**95 % IC**	**p**
Age (years)							**0.069**
15-19	6	37.5	5	8.8	7.2	0.8 -79.4	
20-24	3	18.8	16	28.1	1.3	0.1-11.7	
25-29	5	31.2	21	36.8	1.4	0.2-12.7	
30-34	2	12.5	12	21.0	1		
≥ 35	0	0.0	3	5.3	-	-	
Educational level							0.427
Not in school	10	62.5	27	47.4	1.7	0.3- 9.5	
Primary	3	18.8	9	15.8	1.6	0.2 -13.3	
Secondary	3	18.8	14	24.6	1		
University	0	0.0	7	12.3	-		
SEWL*							**0.000**
Low	**10**	**62.5**	**3**	**5.3**	**21.1**	**3.7-139.8**	
High	0	0.0	16	28.0	-		
Average	6	37.5	38	66.7	1		
Nutritional status							**0.000**
Obese	**2**	**12.5**	**1**	**1.8**	**18.0**	**0.9-623**	
Overweight	0	0.0	7	12.3	-	-	
Lean	**9**	**56.3**	**4**	**7.0**	**20.3**	**3.7-125**	
Normal	5	31.2	45	78.9	1		
GWG**							**0.000**
Excessive	**1**	**6.2**	**1**	**1.7**	**26.5**	**1.2-594.6**	
Insufficient	**13**	**81.3**	**3**	**5.3**	**114.8**	**17.4-759.6**	
Normal	2	12.5	53	93.0	1		
PAL***							**0.000**
B	0	0.0	2	3.5	-	-	
C	16	100.0	16	28.1	-	-	
D	0	0.0	24	42.1	-	-	
E	0	0.0	15	26.3	-	-	
Gestational age							**0.000**
Premature	**7**	**43.8**	**1**	**1.8**	**42.0**	**4.6-383.2**	
Post term	0	0.0	2	3.5	-	-	
Forward	9	56.3	54	94.7	1		

*SEWL: Socio-Economic Well-being Level; **GWG: Gestational Weight Gain; ***PAL: Physical Activity Level

Table 4: Distribution of hypotrophic or normotrophic newborns according to the main sociodemographic characteristics of mothers.

Newborn hypertrophy was proportionally associated with obesity (p=0.003), high GWG (p=0.000), and low physical activity of pregnant women (p=0.000) (Table 5).

	Hypertrophic		**Normotrophic**				
	N=132	**%**	**N=57**	**%**	**OR**	**95 % IC**	**p**
Age (years)							**0.485**
15-19	7	5.3	5	8.8	1		
20-24	40	30.3	16	28.1	1.8	0.4 -6.5	
25-29	37	28.0	21	36.8	1.3	0.3 -4.5	
30-34	34	25.8	12	21.1	2.0	0.5-7.6	
≥ 35	14	10.6	3	5.3	3.3	0.6 -18.1	
Educational level							**0.137**
Not in school	67	50.8	27	47.4	2.9	0.8 -9.4	
Primary	33	25.0	9	15.8	4.3	1.1 -15.9	
Secondary	26	19.7	14	24.5	2.2	0.6-7.7	
University	6	4.5	7	12.3	1		
SEWL							**0.092**
Low	4	3.0	3	5.3	0.7	0.1-3.5	
High	**59**	**44.7**	**16**	**28.1**	**2.0**	**1.0-4.0**	
Average	69	52.3	38	66.6	1		
Nutritional status							**0.003**

Obese	**17**	**12.9**	**1**	**1.8**	**10.6**	**1.4 -82.6**	
Overweight	**37**	**28.1**	**7**	**12.3**	**3.3**	**1.3-8.0**	
Lean	6	4.5	4	7.0	0.9	0.2 -3.5	
Normal	72	54.5	45	78.9	1		
GWG							**0.000**
Excessive	**85**	**64.4**	**1**	**1.8**	**95.8**	**12.8-715. 5**	
Insufficient	0	0.0	3	5.3	-		
Normal	47	35.6	53	98.2	1		
PAL							**0.000**
B	**92**	**69.7**	**2**	**3.5**	**230**	**35.4-493. 2**	
C	**31**	**23.5**	**16**	**28.1**	**9.7**	**2.4-38.5**	
D	6	4.5	24	42.1	1.3	0.2-5.7	
E	3	2.3	15	26.3	1		

*SEWL: Socio-Economic Well-being Level; **GWG: Gestational Weight Gain; ***PAL: Physical Activity Level

Table 5: Distribution of hypertrophic and normotrophic newborns based on socio-demographic, nutritional and anthropometric characteristics of mothers.

Perinatal mortality was significantly associated with low BMI (15.8%, p=0.038), and low GPG (26.3%, p=0.000) (Table 6).

	Total	**Perinatal Mortality**		
	(N)	**n**	**% (n/N)**	**P**
Nutritional status				
Obese	20	0	0,0	
Overweight	45	1	2,2	
Normal	121	4	3,3	
lean	19	3	15,8	
GWG*				**0,000**
Excessive	86	1	1,2	
Insufficient	19	5	26,3	
Normal	100	2	2,0	

*GWG : Gestational Weight Gain

Table 6: Distribution of Perinatal mortality based on nutritional characteristics of mothers.

Discussion

The prevalence of overweight, obesity and thinness in pregnant women was respectively 21.5%, 9.8% and 9.3%. A previous study reported higher prevalence of overweight and obesity in the capital city of our country respectively 30.6%, 18% [9]. The prevalence of obesity in pregnant women is higher in developed countries where obesity is a public health problem: in France 9.9% [10], Canada 16% [11], United Kingdom [12]. The very different eating habits and lifestyles in these countries may explain this difference.

The proportions of pregnant women who had high or low GWG were respectively 41.9% and 9.3%. These proportions of high and low GWG were lower than those observed by Crane and al [13] in Canada, respectively 52.3% and 17.1%. A study in Taiwan found lower proportions of high GWG and higher proportions of low GWG respectively 27.3% and 27.7% [14]. In our series, insufficient GPG was associated with perinatal mortality. Like Goldstein [15] we found that when GWG is not within recommended limits, it is associated with others perinatals complications (neonatal hypotrophy, neonatal hypertrophy).

In our series, obese or overweight pregnant women were at greater risk of delivering by cesarean section. Several studies had shown that obese and overweight pregnant women were more at risk of delivering by cesarean section [9,16]. Dempsey [16] in the United States had shown that a BMI greater than 30 multiplied by three to six the risk of cesarean section. They explained this by a higher risk of preeclampsia, fetal macrosomia and dynamic dystocia leading to cesarean section.

Our results showed that birth weight increased significantly with BMI (p=0.003): Obese or overweight pregnant women had a higher risk of giving birth to hypertrophic newborns. Several studies had also shown that overweight women were more likely to deliver newborns whose weight is over their gestational age weight [7,17,18]. We found in our series that lean pregnant women were more likely to give birth to hypotrophic newborns. Several studies have reported that the frequency of hypotrophic newborns was very low in obese women compared to normal weight women [7,19].

In our series, birth weight was significantly related to GWG (p=0.000). It increased when the GWG became important. Thus, pregnant women with high GWG were more likely to give birth to newborns of high weight. In contrast, pregnant women who had not reached the recommended GWG were more likely to give birth to hypotrophic newborns. Several authors had agreed with the results reported in our work [17,13]. Viswanathan et al. [17] also found that women who do not achieve the recommended GWG during pregnancy are at risk of giving birth to a premature, gestational-age or low weight newborn.

References

1. Ota E, Haruna M, Suzuki M, Anh D, Tho H, et al. (2011) Maternal body mass index and gestational weight gain and their association with perinatal outcomes in Viet Nam. Bull World Health Organ 89: 127-136.
2. Muthayya S (2009) Maternal nutrition & low birth weight - what is really important? Indian J Med Res 30: 600-608.
3. Ntandou Bouzitou G, Fayomi B, Delisle H (2005) Malnutrition infantile et surpoids maternel dans des menages urbains pauvres au Benin. Cahiers Sante 15: 263-270.
4. Clausson B, Gardosi J, Francis A, Cnattingius S (2001) Perinatal outcome in SGA births defined by customised versus population-based birthweight standards. Br J Obstet Gynaecol 108: 830-834.
5. Institute of Medicine and National Research Council Committee to Reexamine (IOM) Pregnancy Weight (2009) Weight gain during pregnancy: reexamining the guidelines. Natl Acad Press.
6. Alihonou E, Ayivi B, Azandegbe N (1988) Contribution à l'etude de la croissance intra-uterine. Medecine d'Afrique Noire 35: 742-747.

7. World Health Organization (2000) Obesity: preventing and managing the global epidemic. WHO Technical Report Series 894.
8. Martin A (2001) Apports nutritionnels conseillés pour la population française. Tec & Doc, Paris. ISBN 13: 9782743004224
9. Djrolo F, Megnigbeto Obey A, de Souza J, Takpara I,Santos P, et al. (2002) Influence dupoids maternel sur l' evolution de la grossesse à Cotonou (Benin). J Gynecol Obs Biol Reprod 31: 243-247.
10. Blondel B, Lelong N, Kermarrec M, Goffinet F (2012) Trends in perinatal health in France from 1995 to 2010. Results from the French National Perinatal Surveys. J Gynecol Obstet Biol la Reprod 41: e1-15.
11. Fuchs F, Senat MV, Rey E, Balayla J, Chaillet N, et al. (2017) Impact of maternal obesity on the incidence of pregnancy complications in France and Canada. Sci Rep 7: 1-9.
12. Zhang J, Bricker L, Wray S, Quenby S (2007) Poor uterine contractility in obese women. BJOG An Int J Obstet Gynaecol 114: 343-348.
13. Crane J, White J, Murphy P, Burrage L, Hutchens D (2009) The effect of gestational weight gain by body mass index on maternal and neonatal outcomes. J Obs Gynaecol Can 31: 28-35.
14. Hung TH, Chen SF, Hsu JJ, Hsieh TT (2015) Gestational weight gain and risks for adverse perinatal outcomes: A retrospective cohort study based on the 2009 Institute of Medicine guidelines. Taiwan J Obstet Gynecol 54: 421-425.
15. Goldstein RF, Abell SK, Ranasinha S, Misso M, Boyle JA, et al. (2017) Association of Gestational Weight Gain With Maternal and Infant Outcomes. Jama 317: 2207.
16. Dempsey JC, Ashiny Z, Qiu CF, Miller RS, Sorensen TK, et al. (2005) Maternal pre-pregnancy overweight status and obesity as risk factors for cesarean delivery. J Matern Neonatal Med 17: 179-185.
17. Viswanathan M, Siega-Riz AM, Moos MK, Deierlein A, Mumford S, et al. (2008) Outcomes of Maternal Weight Gain .AHRQ pub 168: 1030-1038.
18. Ndiaye O, Sylla A, Cisse CT, Guèye M, Ndabashinze P, et al. (2005) Influence de l'excès de poids maternel sur le poids de naissance d'une population de nouveau-nes à terme au Senegal. Journal de pediatrie et de puericulture 18: 33-37.
19. Ducarme G, Rodrigues A, Aissaoui F, Davitian C, Pharisien I, et al. (2007) Grossesse des patientes obeses quels risques faut-il craindre Gynecol Obstet Fertil 35: 19-24.