Adverse perinatal outcomes of pregnancies among adolescents *vs* women of advanced age in the Brazilian public health system

Larissa de Lima Pessoa Veiga [1]
https://orcid.org/0000-0001-8527-7786

Micaely Cristina dos Santos Tenório [2]
https://orcid.org/0000-0002-1771-489X

Raphaela Costa Ferreira [3]
http://orcid.org/0000-0002-1613-8819

Marilene Brandão Tenório [4]
https://orcid.org/0000-0002-7504-0491

Sandra Mary Lima Vasconcelos [5]
http://orcid.org/0000-0002-9438-3537

Nassib Bezerra Bueno [6]
https://orcid.org/0000-0002-3286-0297

Alane Cabral Menezes de Oliveira [7]
https://orcid.org/0000-0002-7497-919X

Abstract

Objectives: to compare the adverse perinatal outcomes in pregnancies of adolescents and elderly women of public health network.

Methods: a cross-sectional study carried out with pregnant women at the extremes of reproductive age according to the classification of the Brazilian Ministry of Health (adolescents those aged ≤19 years and those who were older than 35 years) and their newborns. Socioeconomic data (income, schooling, occupation and marital status), as well as clinical (diseases), anthropometric (maternal BMI) and perinatal (gender, weight, length, Apgar and gestational age) data were collected, and Poisson regression in hierarchical model was performed, with the results in Ratio of Prevalence (PR) and its respective Confidence Interval at 95% (95% CI).

Results: when comparing adolescent and elderly women, 38.7% vs 54.6% (PR=0.71, CI=0.54-0.94, p=0.002) were observed, respectively, cesarean deliveries; 37.8% vs 25.2% (PR=0.83, CI=0.58-1.19, p=0.332) preterm births; 16.6% vs 20.5% (RP=1.07, CI=0.78-1.46, p=0.666) births of small infants for gestational age (SGA); 18.0% vs 15.3% (RP=1.01, CI=0.69-1.47, p=0.948) births of large-for-gestational-age newborns (LGA); 32.2% vs 34.7% (RP=1.08, CI=0.82-1.42, p=0.578), low birth weight infants and 28.5% vs 42.9% (RP=1.18, CI=0.91-1.54, p=0.201) with high birth length.

Conclusions: When compared with adolescent women, pregnant women of advanced age presented a higher frequency of cesarean deliveries.

Key words *Maternal age, Pregnancy complications, Pregnant women*

http://dx.doi.org/10.1590/1806-93042019000300007

Rev. Bras. Saúde Mater. Infant., Recife, 19 (3): 601-609 jul. / set., 2019   601

Introduction

Pregnancy at reproductive age extremes increased considerably worldwide.[1] In Brazil, according to data from the Live Birth Information System for the year 2013, 19.2% of the total number of births was from adolescent mothers and 11.0% of women aged 35 years or older.[2]

Pregnancies at extremes of reproductive age may increase gestational risk due to a high correlation with adverse perinatal outcomes in this period, such as prematurity, low birth weight, anemia, acute fetal distress, hemorrhage-parturition, preeclampsia, gestational diabetes, premature rupture of membranes, among other problems.[3,4]

In addition, reducing maternal and neonatal mortality rate is one of the goals of the global sustainable development goals for 2030, in which Brazil needs to advance in these indicators, continuing the achievements within the Millennium Development Goals by 2015 and reach those unfinished.[5]

In this context, considering the repercussions that pregnancy at extremes of reproductive age provides, it is necessary to develop further studies on this subject in order to foment mechanisms that contribute to the planning of public health policies that guide this population in the perspective of reducing maternal and fetal risk.

In view of the above, the present study aims to compare adverse perinatal outcomes of public health network in pregnancies of adolescents and women with advanced age.

Methods

Cross - sectional study carried out in a maternity school located in the city of Maceió, state capital of Alagoas, Brazil, from August 2015 to July 2016 with pregnant women at the extremes of reproductive age classified according to the Brazilian Ministry of Health (adolescents, those with age ≤19 years and in advanced age those ≥35 years old)[6] and their respective newborns (NB), those with a single fetus being eligible, and those with a severe general condition in labor and with neurological problems were excluded.

The selection of the study participants was made in a random way, from the identification in the records book of the nursing station located in the maternity hospital itself. Then the interviewers, previously trained undergraduate students in the area of nutrition, went to the beds and, following explanation and invitation to participate in the research, proceeded with the application of a questionnaire of their own, containing socioeconomic, prenatal, clinical, anthropometric and perinatal data.

Regarding the socioeconomic data, pregnant women were classified as family income (<1 minimum wage / month / ≥1 minimum wage / month, current value in the year in which data were collected),[7] by level of education (≤4 years of study / >4 years of study, considering the stratification for functional illiterate); occupation (in the household / works outside the home) and according to the marital situation (living with the spouse / not living with the spouse).

As for the prenatal data, the time of onset (1st trimester, 2nd or 3rd trimester) and number of visits (<6 visits / ≥6 visits) according to the Brazilian Ministry of Health.[6]

For the clinical data, pregnant women were questioned about the presence of diseases, such as hypertension, diabetes, kidney disease, among others. In addition, blood pressure measurement was performed at the time of application of the research questionnaire with the help of the Omron 705 CP device, São Paulo, Brazil, following the recommendations of the Brazilian Society of Hypertension.[8] The evaluation of the frequency of anemia was made from the collection of hemoglobin values in medical records and subsequent classification according to the World Health Organization (WHO),[9] considering values below 11.0 g / dL.

For anthropometric evaluation, weight and height of pregnant women were collected using the Filizola® digital scale and its stadiometer, São Paulo, Brazil, respectively, following a methodology described by the Brazilian Ministry of Health and cut-off points established by Atalah Samur *et al.*[10] for classification of Body Mass Index (BMI). Pregestational BMI was also calculated for the establishment of the gestational weight goal according to the United States Institute of Medicine (IOM).[11]

After birth, data on the NB were collected as follows: gender, delivery, gestational age (GI), weight and length at birth, and Apgar score at 1 and 5 minutes of life, being classified as: (1) by GI: GI <37 weeks: preterm NB and GI ≥42 weeks: postterm NB,[12] (2) by birth weight and length, which were assessed using the new INTERGROWTH-21st charts,[13] considered cut-off points in percentiles according to international standards, in which those weighing below the 10th percentile were classified as small for gestational age (SGA), between the 10th and 90th percentiles classified as suitable for gestational age (SUGA) and those weighing more than the 90th percentile large for gestational age (LGA), as

well as through the classification used by the WHO[14] that classifies infants with low birth weight: <2500g, adequate weight: 2500g to <4000g, and fetal macrosomia: ≥4000g, and (3) by the Apgar score in the 1º and 5º minutes of life, considering that ≤6 values for both minutes are characterized as risk for NB.[15]

All statistical analyzes were performed with Stata software version 13.0. Poisson regression was used with robust estimation of the variance in a hierarchical model, where for this purpose, univariate analyzes were performed where the independent variables that presented statistical association with $p<0.20$ were selected to compose the multivariate regression model. The variables of the first hierarchical level (distal level) were analyzed together, and variables with significance greater or equal to 20% were progressively excluded. Then, the variables of the second hierarchical level (intermediate level) were added to the model and proceeded in the same way, with progressive exclusion of the variables of that level with a value of $p≥0.20$. In this way, all hierarchical levels were analyzed. For control of possible confounding factors, variables with $p<0.20$ values were maintained in the models at each hierarchical level.

The magnitude of the associations between the variables studied and the independent variables were expressed in Prevalence Ratio (PR) and their respective 95% confidence intervals (CI95%), with $p<0.05$ being considered significant.

To calculate the statistical power (1-beta) reached with the sample used, we considered an alpha value equal to 5% and the prevalence ratio between groups of the preterm birth variable, considered the primary variable of the study. The GPower v3.1.9.4 (Universitat Dusseldorf, Germany) statistical software was used.

The present study was approved by the Ethics and Research Committee of the Federal University of Alagoas, nº 1.073.200.

Results

A total of 217 pregnant women and 99 pregnant women with a mean age of 16.49 ± 1.8 years and 38.20 ± 2.52 years, respectively, were studied.

Regarding socioeconomic, prenatal, clinical and nutritional status conditions (table 1), women with advanced age presented a higher frequency of low schooling (11.5% *vs* 25.8%, PR=1.51, $p=0.010$); (72.1% *vs* 98.0%, PR=0.05, $p=0.002$) and had a higher frequency of diseases such as gestational hypertension, diabetes *mellitus* and heart disease

(10.1% *vs* 26.2%, RP=1.55, $p=0.010$). The adolescents who had the highest frequency of occupation of the home (95.0% *vs* 68.7%, PR=2.15, $p<0.001$); absence of stable union (24.9% *vs* 4.0%, PR=3.58, $p=0.01$) and low weight (37.3% *vs* 4.0%, PR=0.22, $p=0.020$).

Regarding the perinatal outcomes (table 2), when were compared adolescent and elderly women, respectively, 38.7% *vs* 54.6% (PR=0.71, $p=0.002$) were found to be cesarean deliveries; 37.8% vs 25.2% (PR=0.83, $p=0.332$) and 0.0% *vs* 1.0% (PR=3.64, $p=0.014$) preterm and post-term , respectively; 16.6% *vs* 20.5% (PR=1.07, $p=0.666$) births of SGA NB; 18.0% *vs* 15.3% (PR=1.01, $p=0.948$) births of LGA NB; 32.2% *vs* 34.7%(OR=1.08, $p=0.578$) with low birth weight and 28.5% *vs* 42.9% (PR=1.18, $p=0.201$) with length at birth.

Considering the sample of 217 pregnant women and 99 pregnant women, the PR in this study of 0.83 for preterm births and an alpha of 5%, the statistical power (1 - beta) found was 55.6%.

Discussion

The analysis of adverse perinatal outcomes in adolescent and elderly gestations is of extreme importance for the determination of strategies to prevent and/or ameliorate these complications, aiming to improve maternal and child health, highlighting the progress of indicators of development goals related to this public.[16]

Initially, it is important to observe the socioeconomic and prenatal profile of pregnant women, where part of the adolescents were "home-aged" and a significant proportion did not present a stable union when compared to those with advanced age. On the other hand, the latter had a higher frequency of low schooling than the adolescents.

In this context, in a study carried out with pregnant women at a municipal health service in the state of Bahia,[17] it was observed that more than half of them had household occupation and an education level of only the initial years of elementary school, and about one-third of them had completed elementary school. On the other hand, a study carried out in Curitiba with pregnant adolescents pointed out that most of them were single - a cause for concern - because they are often abandoned by their partners and face pregnancy alone,[18] when the presence of the partner is of fundamental importance for the pregnant adolescent, since it is able to reduce physical and psychological risks, besides promoting greater well-being to the health of the binomial mother-child.

Table 1

Prevalence of factors associated with adolescent *vs* advanced age gestation according to hierarchical model. Maceio, Alagoas, 2014.

Variables	Teenagers (N= 217)		Advanced age (N= 99)		PR set (CI95%)	P*
	n	%	n	%		
Distal level						
Socioeconomic data						
Family income						
≤1 minimum wage	142	71.8	62	64.0	0.83 (0.57-1.20)	0.334
>1 minimum wage	56	28.2	35	36.0	1.00	
No information	19		2			
Schooling						
≤4 years of study	25	11.5	25	25.8	1.51 (1.10-2.07)	0.010
>4 years of study	192	88.4	72	74.2	1.00	
No information	-		2			
Occupation						
Outside the home	11	5.0	31	31.3	2.15 (1.62-2.85)	<0.001
From home	205	95.0	68	68.7	1.00	
No information	1		-			
Stable union						
Yes	163	75.1	95	96.0	3.58 (1.70-7.50)	0.001
No	54	24.9	4	4.0	1.00	
Intermediate level						
Prenatal Data						
Prenatal start time						
1st quarter	152	71.7	73	74.4	1.10 (0.75-1.61)	0.613
2nd and 3rd quarter	60	28.3	25	25.6	1.00	
No information	5		1			
Number of prenatal consultations						
<6 queries	150	72.1	95	98.0	0.05 (0.00-0.34)	0.002
≥6 queries	58	27.9	2	2.0	1.00	
No information	9		2			
Proximal level						
Clinical data						
Presence of disease						
Yes	22	10.1	26	26.2	1.55 (1.11-2.15)	0.010
No	194	89.9	73	73.8	1.00	
No information	1		-			
High blood pressure levels						
Yes	37	17.1	29	29.2	0.96 (0.71-1.30)	0.809
No	179	82.9	70	70.7	1.00	
No information	1		-			
Maternal anemia						
Yes	50	42.8	16	29.0	0.30 (0.21-0.44)	0.898
No	67	57.2	39	71.0		
No information	100		44			

continue

PR= Prevalence ratio, CI= 95% confidence interval. *Poisson regression in hierarchical model, as *p*<0.05 as significant. Intermediate level adjusted by variables= schooling, occupation, stable union and number of prenatal consultations and proximal level adjusted by variables= schooling, occupation, stable union, number of prenatal consultations, pre-existing diseases, high blood pressure and low weight and overweight gestational BMI.

Table 1 concluded

Prevalence of factors associated with adolescent *vs* advanced age gestation according to hierarchical model. Maceio, Alagoas, 2014.

Variables	Teenagers (N= 217)		Advanced age (N= 99)		PR set (CI95%)	P*
	n	%	n	%		
Anthropometric data						
Gestational BMI						
Low weight	78	37.3	4	4.0	0.22 (0.08-0.57)	0.002
Eutrophy	51	24.5	13	13.3	1.00	
Overweight	80	38.2	81	82.7	1.17 (0.88-1.55)	0.265
No information	8		1			
Gestational weight gain						
Insufficient	70	39.1	24	25,5	1.22 (0.75-1.98)	0.422
Suitable	60	33.6	40	42.5	1.00	
Excessive	49	27.3	30	32.0	1.11 (0.78-1.56)	0.548
No information	38		5			

PR= Prevalence ratio, CI= 95% confidence interval. *Poisson regression in hierarchical model, as *p*<0.05 as significant. Intermediate level adjusted by variables= schooling, occupation, stable union and number of prenatal consultations and proximal level adjusted by variables= schooling, occupation, stable union, number of prenatal consultations, pre-existing diseases, high blood pressure and low weight and overweight gestational BMI.

Table 2

Perinatal outcomes of adolescent *vs* advanced age gestation. Maceió, Alagoas, 2014.

Variables	Teenagers (N= 217)		Advanced age (N= 99)		PR set (CI95%)	P*
	n	%	n	%		
Sex of the NB						
Female	110	50.7	56	56.6	1.09 (0.84-1.43)	0.495
Male	107	49.3	43	43.4	1.00	
Way of delivery						
Caesarean	83	38.7	54	54.6	0.71 (0.54-0.94)	0.002
Vaginal	132	61.3	45	45.4	1.00	
No information	2		-			
Gestational Age						
Pre-term	82	37.8	25	25.2	0.83 (0.58-1.19)	0.332
A term	135	62.2	73	73.8	1.00	
Post-term	0	0.0	1	1.0	3,64 (1.29-10.27)	0.014
Birth weight (INTERGROWTH-21st)						
SGA	35	16.6	20	20.5	1.07 (0.78-1.46)	0.666
SUGA	138	65.4	63	64.2	1.00	
LGA	38	18.0	15	15.3	1.01 (0.69-1.47)	0.948
No information	6		1			
Birth weight (WHO)						
Low weight	68	32.2	34	34.7	1.08 (0.82-1.42)	0.578
Suitable	140	66.3	63	64.3	1.00	
Macrossomia	3	1.5	1	1.0	0.70 (0.26-1.89)	0.483
No information	6		1			
Length at birth						
Low	20	11.3	1	1.0	0.25 (0.40-1.64)	0.151
Suitable	106	60.2	55	56.1	1.00	
High	50	28.5	42	42.9	1.18 (0.91-1.54)	0.201
Apgar 1° minute						
≤6	9	7.0	6	6.1	1.18 (0.67-2.08)	0.563
>7	121	93.0	91	93.9	1.00	
Apgar 5° minute						
≤ 6	2	1.6	0	0.0	1.06 (0.93-1.21)	0.359
>7	129	98.4	97	100.0	1.00	

PR= Prevalence ratio, CI= 95% confidence interval, NB= Newborn, SGA= Small for Gestational Age, SUGA= Suitable for Gestational Age, LGA= Large for Gestational Age, WHO= World Health Organization. *Poisson regression, variables adjusted for maternal variables of schooling, occupation, stable union, number of prenatal consultations, pre-existing diseases and low-weight gestational BMI.

Regarding prenatal care, similar to the results of this study, in a study conducted in Paraná, only 69.4% of the pregnant women with advanced age performed six or more visits, and among the adolescents the frequency was even lower (49.4%).[19] The literature indicates the importance of prenatal care as a determinant of adequate gestational evolution, being crucial for the reduction of age-related risks and obstetric and neonatal complications. In addition, the minimum number of six consultations recommended by the Ministry of Health ensures the performance of specific interventions and the identification of risk situations, especially at the end of gestation.[6]

With regard to the adverse perinatal outcomes in this study, a high frequency of cesarean delivery was observed in pregnant women with advanced age (54.6%), and it should be considered that the WHO establishes a maximum prevalence of 15.0% of deliveries by this way.[20] It has also been shown that, similarly to the findings in this study, women of advanced age are more likely to have a cesarean birth when compared to younger women.[21] This finding may be justified by the high incidence of risk factors verified here, (greater frequency of diseases in pregnant women in old age when compared with the adolescents), disorders in labor and obstetric and fetal complications with advancing age.[22]

In addition, in the present study, a high frequency of preterm births was observed in both groups of pregnant women when compared with data from Brazil[24] of premature live births in the year 2015 (10.78%). On the other hand, in a transnational study[23] performed in 29 countries, a higher occurrence of preterm birth was found in the adolescent group.

Regarding birth weight deviations in this study, high birth rates of SGA, LGA and low birth weight infants were observed in both groups, with no significant difference when compared.

In this context, similarly, in a study carried out in a public tertiary maternity hospital in São Paulo,[25] there was no significant relationship between maternal age and birth of SGA infants. Some authors report that the birth of SGA in adolescent gestation would be justified by physical immaturity and, in old age, by sclerotic lesions in the myometrial arteries.[26]

On the other hand, the prevalence of LGA found in the present study, elevated in both groups, is higher than that detected by other authors (3.4% and 7.3%)[27] which may be justified by changes in dietary and nutritional patterns of the global population, resulting in an increase in the rates of overweight, obesity, non-communicable chronic diseases, and a change in the pattern of distribution of morbidity and mortality in the population.[28] Additionally, in the long term, LGA newborns are more prone to developing childhood obesity and, as adults, metabolic syndrome, where the intrauterine scenario reflected by birth weight may be a determinant of the child's future nutritional status.[29]

Finally, despite the adverse perinatal outcomes presented, most of the NB in this study had good vitality at birth according to the values of Apgar in the 1º and 5º minutes of life. Muniz *et al.*[30], evaluating the vitality of the NB, through the Apgar index in a hospital in Ceará, through data from the information system on live births, found higher Apgar values (8-10) among women in the age range of 20-29 years, with term delivery, as well as in those who performed more prenatal visits.

Thus, the results of this study suggest the need to adopt measures that allow a better quality of care for pregnant women with the objective of minimizing the possible adverse factors resulting from gestations at the extremes of reproductive age.

As limitations of this research, we highlight the type of study, a transversal one, as well as the selection and the provenance of the sample, making it difficult to extrapolate the results to the entire capital of the state of Alagoas.

In this study, older women, when compared with adolescent pregnant women, presented a higher frequency of cesarean deliveries.

Thus, the early detection of unfavorable outcomes in pregnancy and the adequate performance of prenatal care should be encouraged and prioritized by public health agencies, aiming at the adoption of preventive measures against the adverse outcomes of these pregnancies, including programs with multiprofessional actions in the health units. It is also relevant a greater interaction of these with the community agents, favoring an integral assistance to these women, and with that, smoothing unfavorable outcomes of gestations in the extremes of reproductive age.

Authors contribution

Veiga LLP and Tenório MCS - data collection and the writing of the article. Ferreira RC and Tenório MB - contributed to the writing of the article. Vasconcelos SML - critical review and writing of the article. Bueno NB - statistical analysis and critical review. Oliveira ACM - study design and the writing of the article. All authors approved the final version of the manuscript.

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