

Prematurity in a Sample of Brazilian Twins: A Cross-Sectional Study

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Abstract

Objective: To evaluate the characteristics of newborns of pregnant women attending a public maternity hospital in Rio de Janeiro, Brazil.

Methods: A retrospective cross-sectional study of records of newborn twins from adult and adolescent pregnancies. Twins were divided into two groups, Twin 1, the first one delivered, and Twin 2, the second. The association between gestational age at birth and neonatal characteristics were analysed using Chi Square and Fisher's exact tests and associations were considered significant when p-values were ≤ 0.05 .

Results: We evaluated 218 infants with a mean gestational age of 35.7 weeks at birth. The groups twin 1 and 2 showed, respectively, average weight at birth of 2343.9 grams (SD = 627.3) and 2267.6 grams (SD = 608.2). Most twins of group 1 presented appropriate birth weight (n = 53; 48.6%) and were classified as appropriate for gestational age (n = 88; 80.7%). The group twin 2 had, mostly, low birth weight (n = 55; 50.5%), and were classified as appropriate for gestational age (n = 93; 85.3%). Prematurity was relevant to the development of postnatal complications (twin 1 - p = 0.002; twin 2 - p = 0.001) and low birth weight (twins 1 - p = 0.000; twins 2 - p = 0.000) for both groups. Conclusion: Prematurity was an important risk factor for the development of postnatal metabolic and respiratory complications and low birth weight for both groups.

Keywords: Twin pregnancy; Nutritional Epidemiology; Prenatal care; prenatal nutrition; Prematurity

Introduction

Twin pregnancies are high maternal and fetal risk and few studies consider the magnitude of the associated factors (maternal family history, advanced maternal age, high parity, personal history of twin pregnancy, ovulation induction and use of assisted reproductive technologies) in obstetrical management [1-2]. They represent a high number of admissions to the intensive care unit and is described that perinatal mortality is proportional

to maternal age [3] and the number of foetuses, four to six times higher compared to singleton pregnancies [4-5].

The twins have changes of different magnitudes in childhood, compared to single newborns, with a strong tendency to be born with low weight and gestational age [6]. According to the survey "Nasser no Brazil" the rate of neonatal mortality in twin pregnancies corresponds to 52.2 per 1,000 live births which represents a 5 times greater risk for neonatal mortality multiple foetuses compared to single [7].

The FETAL development of twins is virtually identical to the single foetuses up to 32 weeks of pregnancy and then there is a slowdown in growth and may result in high rates of intrauterine growth restriction (IUGR) in term pregnancies [8-9]. About 10% of monozygotic twins (derived from individuals of a fertilized egg) have a weight of disagreement at birth more than 10% and higher expectation of being classified as small for gestational age (SGA) [9, 10].

The low weight at birth in twin research, complication capable of raising birth rates Caesarean, prematurity and disabling accommodation postpartum whole is rarely described in the literature. In Porto Alegre, Brazil, a rate of 24.7% of low birth weight in twin pregnancies in 11 years of research has demonstrated [11].

Some of multiple pregnancy associated changes represent high maternal and fetal risk highlighting the fatal anomaly, intrauterine death, premature rupture of membranes and discordant preterm delivery, conjoined twins, twin to twin transfusion syndrome and TRAP sequence (Twin Reversed Arterial Perfusion Sequence) or twin acardiac [1].

Preterm birth in twin pregnancy has an average occurrence rate of 30% to 50% being more prevalent in monochorionic pregnancies (present only one placenta) than dichorionic (two

different placentas) [12]. The mean gestational age at birth to the twins is three weeks shorter than for single gestation and birth weight will depend on the time of pregnancy is significantly lower for twins [13]. In addition to prematurity, monochorionicity is one of the most important factors responsible for morbidity and mortality in twin pregnancies [14].

The reduction in preterm birth rates is one of the main goals of prenatal care in twin pregnancies [15]. However, when considering the reduction of fetal mortality considering birth weight and gestational age, are as ideal references 2500g to 2800g and 36 to 37 weeks. Population studies show that perinatal mortality increased from 38 weeks gestation, being prudent to anticipate the interruption of delivery in these pregnancies [16-17].

Knowing the neonatal anthropometric and clinical conditions of the twin structure will enable the pre care and post-natal and promote fetal development. This study aims to evaluate the characteristics of newborn twin pregnant women assisted in a public hospital in Rio de Janeiro, analysing gestational age and birth weight.

Methods

Cross-sectional study, consisting of twin newborns born adult and adolescent women who were followed during the prenatal and childbirth in a public maternity hospital in the city of Rio de Janeiro, from January / 2011 to December / 2013. The sample was for convenience and the data obtained from medical chart review.

The survey was conducted at a maternity hospital located in the south of the city of Rio de Janeiro, health unit has multi-service, specializes in services to multiple pregnancies.

Inclusion criteria were twin neonates born to adolescent and adult pregnant women, double pregnancy (two fetuses), mono or dizygotic, mono or dichorionic, mono or diamniotic accompanied prenatal and delivery in the study hospital. They excluded pregnant women who have undergone abortion process or intrauterine fetal death during prenatal care and conjoined twins.

In the period studied were met in 6442 maternity mothers with single or twin pregnancies, being selected 151 medical records of twin pregnant women and their newborns, which were analyzed 109 who met the inclusion criteria for the study. They were excluded from the study, 42 records, for pregnant women did not undergo prenatal and / or delivery in maternity studied, because they are triplet pregnancies and due to the occurrence of discordant intrauterine death or Vanish Twin in different gestational ages. They selected 218 twins divided into two groups, called T1 as the first born and the last T2.

The collection of medical record data was performed by trained staff and recording information of pregnant women occurred in standardized protocol containing maternal information and newborns (sociodemographic, clinical, obstetrical and gynaecological, prenatal care, childbirth and postpartum, anthropometric and nutritional).

The dependent variables were: gestational age at birth according to ultrasonography (premature, if < 37 weeks; term, if > 37 weeks) and weight rating birth measured continuously and categorically (normal weight, if > 2500g; low weight is <2500 g, very low birth weight if < 1500 g, extremely low weight if < 1000g).

Independent variables related to fetuses were studied, such as: classification of newborns according to gestational age at birth (extreme immaturity if <28 weeks; preterm if <37 weeks, the term is between 37 to 42 weeks), weight (grams), length (cm) and head circumference at birth (cm); Apgar 1 and 5 minutes (<7, low vitality at birth, > 7, adequate vitality at birth) [18-20]; somatic Capurro (weeks); classification of weight according to gestational age [21] (small for gestational age - SGA if weight <10th percentile; appropriate for gestational age - AGA, if weight is between 10 and 90 percentiles, large for gestational age - LGA if weight > 90th percentile) [22]; presence of congenital anomalies; site postpartum hospital stay (rooming or Neonatal Intensive Care Unit - NICU); reason for hospitalization in the NICU; type of food during hospitalization (zero diet, breast milk exclusively, only infant formula, breast milk associated with infant formula, total parenteral nutrition or exclusively associated with infant formula); fetal complications in the first seven days of life (neither, metabolic, respiratory, malformations, infectious, early neonatal death - when this occurs within 7 days after delivery); length of stay; weight, length and head circumference at discharge.

Exploratory data analysis was performed with a description of the sample with estimates of mean and standard deviation (SD) for continuous variables and proportions for categorical variables. The association between gestational age at birth and neonatal characteristics were analyzed using Chi Square and Fisher's Exact tests were considered significant p values less than 0.05. Statistical analysis was performed with SPSS (Statistical Package for Social Sciences) software for Windows version 21.0.

Results

Two hundred and eighteen newborns twins with were evaluated with a mean gestational age at birth of 35.7 weeks by ultrasound (SD = 3.1). The births were caesarean of type in 92.7% of the sample (n = 101) and 7.3% (n = 8) were vaginal. Considering maternal characteristics were evaluated 109 women, 101 adults with an average age of 28.3 years (SD = 5.1) and 8 adolescents with a mean age of 16.2 years (SD = 1.9).

The T1 and T2 presented, respectively, average weight at birth of 2343.9g (SD = 627.3) and 2267.6g (SD = 608.2), length of 44.6 cm (SD = 4, 1) and 44.6cm (SD = 4.0), head circumference of 32.4cm (SD = 2.7) and 32.1cm (SD = 2.6) and mean gestational age by method Capurro of 36.0 weeks (SD = 3.0) and 36.1 weeks (SD = 2.7).

The average length of hospital stay for the T1 was 13 days (SD = 21.8) ranging from 1-105 days and the average high weight was higher than the birth weight, corresponding to 2429.5g (SD = 452.3). T2 remained on average 12.7 days (SD = 22.1) admitted, ranging from 2-117 days and mean weight at discharge equal to 2336.8g (SD = 420.3). Information about the head circumference

and length at discharge were underreported or were not available in the medical records of all twins. Information regarding the T1 showed that they had an average head circumference of 33,2cm (n = 10, SD = 2.7) and the G2 was 32,1cm (n = 10, SD = 2.7) at the time of hospital.

The early neonatal death was similar in T1 (n = 2; 1.8%) and T2 (n = 2, 1.8%) as described in Table 1. Most T1 was male (n = 56; 51.9%) had adequate birth weight (n = 53; 48.6%) showed good vitality at birth according to the Apgar at 1 (n = 94; 86.2%) and 5 minutes (n = 106; 97.2%) were classified as AGA (n = 88;

80.7%) were in accommodation postpartum set (n = 58; 53.2%) and were fed composed of infant formula and breast milk (n = 73; 67.0%).

Most T2 was woman (n = 56; 51.4%) had low birth weight (n = 55; 50.5%), good vitality at birth according to the Apgar score at 1 (n = 106; 97.2%) and 5 minutes (n = 106; 97.2%) were classified as AGA (n = 93; 85.3%) remained in the accommodation postpartum set (n = 61, 56, 0%) and were fed a combination of breast milk and infant formula (n = 76; 69.7%) (Table 1).

Table 1: Conditions at birth, clinical and anthropometric characteristics of twins followed in a public maternity of Rio de Janeiro, RJ.

Characteristics of twins	T1		T2	
	n	%	n	%
Condition at birth				
Born alive	107	98,2	107	98,2
Stillbirth	2	1,8	2	1,8
Total	109	100	109	100
Classification according to gestational age at birth				
Term	52	47,7	52	47,7
Preterm	52	47,7	52	47,7
Immaturity extreme	5	4,6	5	4,6
Total	109	100	109	100
Gender				
Male	56	51,9	53	48,6
Female	52	48,1	56	51,4
Total	108	100	109	100
Birth weight classification				
Extremely low birth weight	6	5,5	6	5,5
Very low birth weight	4	3,7	7	6,4
Low birth weight	46	42,2	55	50,5
Normal weight	53	48,6	41	37,6
Total	109	100	109	100
Apgar 1^o minute				
< 7	15	13,8	3	2,8
> 7	94	86,2	106	97,2
Total	109	100	109	100
Apgar 5^o minute				
< 7	3	2,8	3	2,8
> 7	106	97,2	106	97,2
Total	109	100	109	100
Relationship weight / gestational age				
<p10	17	15,6	16	14,7
p10-p90	88	80,7	93	85,3
>p90	4	3,7	0	0,0

Total	109	100	109	100
Place of postpartum hospitalization				
Rooming-in	58	53,2	61	56,0
NICU	51	46,8	48	44,0
Total	109	100	109	100
Label: T1 (Twin 1), T2 (Twin 2), GA (Gestational Age), NICU (Neonatal Intensive Care Unit).				

Among the T1 newborns, 38.5% (n = 42) had metabolic complications, highlighting hypoglycaemia and jaundice. Respiratory changes occurred in 23.9% of cases (n = 26) mainly respiratory distress and hyaline membrane disease. Regarding T2, 37.6% had metabolic complications (n = 41), especially hypoglycaemia and

jaundice and 20.2% respiratory complications (n = 22), especially tachypnea.

Given the high prevalence of prematurely born fetuses (47.7%), neonatal characteristics were described as gestational age at birth of T1 and T2 (Tables 2 and 3).

Table 2: Relationship of neonatal characteristics with gestational age at birth of T1 followed in a public maternity in Rio de Janeiro, RJ, Brazil

Neonatal characteristics of T1	Gestational age at birth		Total	p
	< 37 weeks	> 37 weeks		
Birth weight classification				
Extremely low birth weight	6	0	6	0,000
Very low birth weight	4	0	4	
Low birth weight	31	15	46	
Normal weight	16	37	53	
Total	57	52	109	
Apgar 1^o minute				
< 7	11	2	13	0,017
> 7	46	50	96	
Total	57	52	109	
Apgar 5^o minute				
< 7	3	0	3	0,245
> 7	54	52	106	
Total	57	52	109	
Relationship weight / gestational age				
<p10	11	6	17	0,387
p10 - p90	45	43	88	
> p90	1	3	4	
Total	57	52	109	
Place of postpartum hospitalization				
Rooming-in	14	44	58	0,000
NICU	43	8	51	
Total	57	52	109	
Tipo de alimentação na internação				

Neither	2	0	2	0,029
Breastmilk	6	13	19	
Infant formula	4	2	6	
TNP	1	0	1	
Breastmilk + Infant formula	36	37	73	
Infant formula + TPN	3	0	3	
Breast Milk + Infant formula + TPN	5	0	5	
Total	57	52	109	
Presence of neonatal complications				
No	8	21	29	0,002
Yes	49	31	80	
Total	57	52	109	

Legend: T1 (Twin 1), NICU (Neonatal Intensive Care Unit), TPN (Total Parenteral Nutrition).

Table 3: Relationship of neonatal characteristics with gestational age at birth of T2 followed in a public maternity in Rio de Janeiro, RJ, Brazil.

Neonatal characteristics of T2	Gestational age at birth		Total	p
	< 37 semanas	> 37 semanas		
Birth weight classification				
Extremely low birth weight	6	0	6	0,000*
Very low birth weight	7	0	7	
Low birth weight	39	16	55	
Normal weight	5	36	41	
Total	57	52	109	
Apgar 1^o minute				
< 7	14	1	15	0,001*
> 7	43	51	94	
Total	57	52	109	
Apgar 5^o minute				
< 7	3	0	3	0,245
> 7	54	52	106	
Total	57	52	109	
Relationship weight / gestational age				
<p10	10	6	16	0,086
p10 - p90	47	46	93	
Total	57	52	109	
Place of postpartum hospitalization				
Rooming-in	13	48	61	0,000
NICU	44	4	48	
Total	57	52	109	
Feed type in hospital				

Nenhuma	2	0	0	0,001
Breastmilk	3	13	16	
Infant formula	5	1	6	
Breastmilk + Infant formula	38	38	76	
Infant formula + TPN	2	0	0	
Breastmilk + Infant formula + TPN	7	0	7	
Total	57	52	109	
Presence of neonatal complications				
No	8	30	38	0,000
Yes	49	22	71	
Total	57	52	109	
Legend: T2 (Twin 2), NICU (Neonatal Intensive Care Unit), TPN (Total Parenteral Nutrition).				

The prematurely born T1 showed higher weight deviation (low weight, very low birth weight and extremely low birth weight) compared to those born at term ($p = 0.000$). The same results were found for T2 ($p = 0.000$).

The first minute Apgar score was satisfactory to both, however, observed a higher number of premature twins with index less than 7, showing a low fatal birth for T1 ($p = 0.017$) and T2 ($p = 0.001$). The Apgar 5 minutes no difference to T1 ($p = 0.245$) T2 ($p = 0.245$) were born prematurely or not.

The analysis of the gestational age at birth and weight rating for gestational age showed no significant difference with respect to T1 ($p = 0.387$) and T2 ($p = 0.086$).

According to the site postpartum hospital stay, it is observed that more premature infants were allocated in the neonatal NICU after delivery compared to those who were born with adequate gestational age, both the T1 ($p = 0.000$), as for T2 ($p = 0.000$).

During the hospital stay, it is observed that only premature neonates receiving TPN isolated (T1) or associated with infant formula and / or breast milk (T1 and T2), and it was identified that two premature neonates were zero diet during admission evolving to death. The breast milk supply alone was higher for the group of infants with adequate gestational age T1 ($p = 0.029$) and T2 ($p = 0.001$).

Neonatal complications were identified in greater numbers in T1 ($p = 0.002$) and T2 ($p = 0.000$) with gestational age at birth less than 37 weeks, unlike those with adequate gestational age.

Discussion

Identify gaps in relation to the study of twins makes it possible to propose solutions to reduce maternal and fetal morbidity and mortality. Prematurity, associated with maternal complications of multiple pregnancies should be investigated in order to minimize risks to the mother-child binomial [23].

Prematurity and the average maternal age were relevant factors in this study and may represent adverse perinatal outcomes. Research in Mexico [24], which analyzed the determinants of birth weight in 244 double pregnancies,

found average maternal age in adult of 28 years (SD = 7.0) and gestational age at birth 35 weeks, similar to those found in this study. Doss et al. [25], showed that the optimal gestational age associated with lower Perinatal mortality is more than 38 weeks pregnancy and births less than 36 weeks gestation, the risk of infectious complications, respiratory and admission to NICU rise by 4 to 6 times. Garner and Oliveira de Barros [26], in a study with women from multiple pregnancies by assisted reproduction techniques found mean maternal age of 33.9 years and 64.9% of births before 36 weeks.

Most deliveries were caesarean (92.7%) in the sample, far superior results to those found in national and international studies. American survey of 377 twin pregnancies found 52.5% of spontaneous births and 47.5% caesarean [25], different from that found in this study. However, in Rio de Janeiro, Brazil, study of 104 twin pregnancies [27] showed 69% of surgical deliveries. In São Paulo, Brazil, study of 249 twin pregnancies revealed that 84.8% were caesarean [29], approaching the results found in this study. Caesarean section is recommended in monoamniotic pregnancies when the fetes are not in cephalic presentation and if there is high risk for the combination of abdominal and vaginal delivery [29] may represent maternal and fetal protection factor [30].

Much of the concepts were classified as low birth weight, being more frequent for G2 than for G1. In Maringa, Paraná, Brazil, Cardim and colleagues [31] found low birth weight in 64% of the sample. Maximiano [27] showed a higher frequency of low birth weight in group 2 (60.6%), a result similar to that found in this study. The low birth weight may be related to prematurity, maternal complications and gestational weight gain and should be a relevant factor in neonatal care.

Twins are at greater risk of developing intrauterine growth deviations compared to single, very often characterized as IUGR [32]. Understanding this dynamic depends on weight ratings considering the gestational age according to the recommendations for the twin foetuses. In the present study, the majority of the twin 1 and 2 was classified as AGA and approximately 15% were SGA. We also observed that 3.7% were classified as T1 LGA, while no T2 reached this classification.

The vitality at birth can determine the neonatal development and is related to the hospital stay and institutional costs. Most twin 1 and 2 showed good vital according to Apgar first and fifth minutes. A similar result was found by Maximiano [27] also noted that among the twin 1 and 2, the first present with higher Apgar scores than the others. Neonatal depression, represented by Apgar score <7, was seen in only 2.7% of a sample of 1429 multiple Argentine newborns [33], lower than that found in this study.

Metabolic complications were proportionally higher than the other (respiratory, infectious, malformations and neonatal death), both for the T1 as for the T2 and, among them, stood out hypoglycaemia and jaundice and death in the early neonatal period occurred similarly for both twins. A study conducted in São Paulo, Brazil, from 131 medical records of multiple pregnancies resulting from assisted reproduction techniques showed that 37.5% of newborns had jaundice and early neonatal death rate reached 2.7% [26].

Lateral and colleagues [33] demonstrated that early neonatal mortality rate reached 2.9% (n = 42) in a sample of 10-year study of multiple pregnancies in Buenos Aires, Argentina. Early neonatal death was lower than that found in other studies may reflect the proper development of the fetes and possibly indicating an effective prenatal care. The care offered to pregnant women in the twin study of motherhood can be extremely important factor to contribute to the findings of this study, as there are specific institutional protocols that guide the perinatal care, in addition to the infrastructure available for quality care.

Postnatal stay in the NICU was lower than in rooming-in for both twins, which may represent a good postnatal prognosis. Doss and colleagues [25] demonstrated that premature birth is responsible for high admission rates in intensive care units and the risk six times higher for those with 36 gestational weeks compared to 38 weeks and that the risk decreases with increasing age gestational at birth. Recommendations for the prenatal care of twin pregnancies [34-35] consider that dichorionic pregnancies should be discontinued, electively, at 37 weeks, while for monochorionic is considered 36 weeks and to prolong gestation to 38 weeks increases the risk of fatal death.

Preterm birth caused by premature labour, premature rupture of membranes or iatrogenic factors, is the most important fatal complications in multiple pregnancies and increases the adverse neonatal outcomes [34, 36]. It is usual for the multiple pregnancies that labour occurs spontaneously before 37 weeks and the mean gestational age is inversely related to the number of foetuses: 35-36 weeks for twins, 32 to 34 for triplets and less than 30 for other categories of multiple pregnancy [37].

Low birth weight was significantly related to preterm birth for both the T1 and T2. In 2006, the United States, 60% of twin births were premature, classified as low birth weight and that 1 to 10 twins (n = 13,983) was born less than 1500g [38].

The Apgar score in the first minute below 7 was rated among the twin 1 and 2 and it was observed that in premature infants, the prevalence of this change was higher. The same finding was not

repeated for the Apgar score in the fifth minute. Study in Caxias do Sul, Rio Grande do Sul, Brazil, with multiple pregnancies (n = 193) showed similar results and associated low Apgar score with a reduction in umbilical artery pH, which can be caused by prolonged labour (more than 60 minutes) which can increase the risk of neonatal acidosis[39].

Preterm newborns may require intensive care during the neonatal period and in relation to premature twins, this assumption is confirmed. It was observed a significant relationship between the NICU - Neonatal and preterm delivery for T1 and T2. The admission to intensive care unit was 10% higher for twins at 36 weeks gestation than for newborns only in an American sample with 260 twins and the main causes for this high admission would be transient tachypnea, suspected sepsis and infants small for gestational age [25].

Brazil recommends that breastfeeding is encouraged for all newborns [40]. In the present study breast milk supply often associated with infant formula for T1 and T2 was similar, regardless of gestational age at birth. Qualitative study [41] that investigated breastfeeding in twin, identified that problems like long-time duration of breastfeeding, exhaustion, lack of help in the care of children and information with respect to power multiple, can be factors for the failure of this practice and, in addition, many women find that their milk is not strong enough for twins, asking thus the supply of infant formula. Damato and colleagues [42] show that the main unfavourable conditions related to multiple breastfeeding would prematurity, lack or weak sucking reflex, neurological immaturity and the permanence of the concepts for long periods in intensive care. Important to note that the supply of infant formula and parenteral nutrition can significantly increase hospital costs and family after discharge, should be minimized and better conducted in health facilities.

The particularities involving multiple pregnancies and care for twin newborns are important objects of study, especially the growing number of cases arising from technological development to enable safe assisted reproduction techniques and advanced maternal age [40,43].

The limitations of this study was the fact that present data in a single maternity in Rio de Janeiro, Brazil, which prevents generalized conclusions about the population of twin pregnancy; the lack of comparison of data from twin newborns studied with a group of unique newborns, which could demonstrate features differential between these population groups.

Conclusion

In this study, prematurity constitute an important risk factor for the development of postnatal complications and low birth weight neonates of both. Good vital vitality to T1 and T2 shown by the Apgar score and the adequacy of the weight / gestational age can be considered important findings and translate adequacy of maternal and fetal care. The rooming-in for most newborns and breast milk supply consists of experiences that enable early hospital discharge and good nutrition of twin newborns. The reduced early neonatal death rate may reflect the quality of perinatal care.

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Declarations

Ethical Approval

Authors signed a confidentiality agreement for medical data. The study followed the standards of the National Health Council and it was approved by the Research Ethics Committee from the Maternity School of the Federal University of Rio de Janeiro at 07/18/14 (protocol CAE 329977114.9.0000.5275).

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