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Research Article | SOJ Gynecology, Obstetrics and Women's Health | Open Access

# Epidemiological and Nutritional Characteristics of Twin Gestations in a Sample of Brazilian Maternity Hospital

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**Received: February 20, 2018; Accepted: March 13, 2018; Published: April 03, 2018**

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## Abstract

**Objective:** The aim was to describe socio demo graphic, clinical, obstetric and nutritional profile of twin pregnants receiving prenatal care at a public maternity hospital in Rio de Janeiro.

**Methods:** An analytical and cross-sectional study was conducted from consulting patient records during prenatal care and delivery for adults and teenagers twin pregnancy. Exploratory data analysis included sample description through averages and standard deviation (SD) for continuous variables and proportions for categorical variables. The chi-square test and the Fisher exact test were used to detect association between maternal age (adult or teenager) and independent variables

**Results:** 109 pregnant women were evaluated, 101 were adults and eight were teenagers. Adults and teenagers were similar for the variables pre-pregnancy body mass index (p=0,709), complications during delivery (p=0,638) and postpartum (p=0,674), adequacy of gestational weight gain (p=0,631), gestational age at birth (p=0,791) and type of delivery (p=0,423). The most frequent pregnancy complications were anemia 49(44.9) and hypertensive disorders during pregnancy31(28.4). Prematurity occurred in 52.3% and 92.7% of deliveries were cesarean. Percentage of normal pre-pregnancy body mass index was 53.3%, insufficient weight gain was62.6% and 75.2%were referred a nutritional care during pregnancy.

**Conclusion:** The high prevalence of obstetric complications, caesarean delivery and prematurity are important issues for twin pregnancy. The inadequate total weight gain shows the need for nutritional care during twin pregnancy.

**Keywords:** Twin pregnancy; Nutritional Epidemiology; Prenatal care; Prenatal nutrition

## Introduction

The incidence of twins is influenced by maternal, genetic and environmental factors, ranging from 0.3% to 1.8% of all live births in different countries[1]. In Brazil, Beiguelman and Franchi-Pinto described the occurrence of twin pregnancy at a rate equal to 0.88% between 1984 and 1993 in São Paulo; Heineck and colleagues evaluated births between 1998 and 2007 and found a rate of 1.3% in Pelotas; in Rio Grande do Sul, Geraldo and colleagues[2-4] observed average rate of 0.89%.

The probability of multiple pregnancy increases with advancing maternal age, even those who did not use assisted reproduction techniques. The proportion of twin births increased from 16.3:1,000 live births in women under 20 years to 71.1:1,000 live births for those aged 40 or more in the United States[5]. Women older than 30 years showed a high rate of monochorionic pregnancy (7.04:1000 births), and these results can be attributed in part to the effects of prolonged use of oral contraceptives, although it is not possible to rule out the in vitro fertilization [6]. These women are more likely to have obstetric complications, regardless of the number of fetuses, the most prevalent gestational hypertension, gestational diabetes mellitus(GDM) and placental abruption[5].

Multiple pregnancies are associated with increased risk of maternal and fetal perinatal morbidity and mortality, especially low birth weight, higher incidence of premature delivery, preeclampsia and eclampsia, hemorrhage in childbirth and postpartum. It is also described very often, the occurrence of hyper emesis, anemia, abnormal presentations and fetal malformations[7].

The importance of maternal nutrition has been highlighted for many years, and it is known that to achieve adequate fetal growth and development, and maintenance of health and maternal well-being, a woman must have an adequate nutrition[8]. Studies identified association between intrauterine nutrition and reduction of morbidity and mortality in adulthood [9-10].

For twin pregnancies, there are consistent evidences between maternal weight gain and positive perinatal outcomes, including reduction in the incidence of low birth weight and premature infants with very low birth weights and longer gestation[11].

Given the particularities of multiple pregnancies, the need to characterize this population and the lack of studies that extensively address the issue, the aim of this study was to evaluate the profile of twin mothers assisted in a public maternity hospital in Rio de Janeiro.

## Methods

This cross-sectional study consisted of adult women and teenagers with twin pregnancies followed during the prenatal in a public maternity hospital in the city of Rio de Janeiro, Brazil, from January/2011 to December/2013. The sample was for convenience obtained from consulting the data in the records.

The survey was conducted in a public maternity hospital that has specialized service in the care of multiple pregnancies, located in the southern part of the city of Rio de Janeiro.

Data collection was performed by trained personnel and the information record of prenatal staff opinions and exams available in the medical records of pregnant women took place by completing a standardized protocol.

Inclusion criteria included double pregnancy (two fetuses), prenatal care and delivery at the study hospital. Pregnant women who have undergone abortion process or intrauterine fetal death and showed record conjoined twins were excluded.

During the study period, from 6442 pregnants, 151 were twin pregnant women and 109 had the inclusion criteria for the study.

The dependent variables of the study were: clinical and obstetric complications during pregnancy (yes, no), occurrence of Hypertensive Disorders During Pregnancy (HDDP) (yes, no) and anemia (yes, no), identified as recommended by the Ministry of Health; digestive symptoms (yes, no); total weight gain adequacy, gestational weight gain until 20 weeks, 20-28 weeks and 28 weeks until delivery (continuous - kg and categorical - inadequate, adequate, excessive) as Luke and colleagues[10] recommendation; gestational age at delivery (continuous - weeks - and categorical - <37 weeks, > 37 weeks) [12].

The independent variables were:

* Socioeconomic and demographic variables analyzed as continuous and / or categorical variables: age (<20 years, 20-30 years,> 30 years), place of residence (south zone of Rio de Janeiro; other locations), skin color (white, brown and black), marital status (single, separated, divorced or widowed, married or living with a partner), years of education (up to 7 years, from 7 to 11 years, 11 years or more), occupation (yes, no ) and use of licit or illicit drugs during pregnancy (yes, no).

* Obstetrical and clinical variables were: menarche and first sexual intercourse (years - continuous variables), inter pregnancy and intergestational intervals (months - continuous variables), number of pregnancies (continuous and categorical - primiparous and multiparous), previous abortion (yes, no) , prior twin pregnancy (yes, no) and family history of multiple births (yes, no), use of contraceptive methods (yes, no), conducting clinical or medical treatment to get pregnant (yes, no), type of twin pregnancy (monochorionic / monoamniotic; monochorionic / diamniotic; dichorionic / diamniotic).

* Prenatal care, delivery and postpartum variables: gestational age at first prenatal visit (continuous - weeks), number of consultations with obstetrics (continuous and categorical - < 6; > 6), assistance prenatal nutrition (yes, no), number of consultations with a nutritionist (continuous and categorical - < 4; > 4) and type of delivery (normal, cesarean section).

* Nutritional variables: pre-pregnancy weight (continuous - kg), height (continuous - meters), pre-pregnancy body mass index (BMI) (continuous - kg / $m^2$), classification of pre-pregnancy BMI (low weight - <18.5 kg / $m^2$; eutrophic - 18.5 and 24.9 kg / $m^2$, overweight - 25 to 29.9 kg / $m^2$, obesity > 30 kg / $m^2$), adequacy of gestational weight gain (insufficient, adequate and excessive) according to Luke and colleagues, pre-birth weight or last consultation of prenatal care (continuous - kg) and consumption of supplements of vitamins and minerals (yes, no) [13,10].

Exploratory data analysis included sample description through averages and standard deviation (SD) for continuous variables and proportions for categorical variables. The chi-square test and the Fisher exact test were used to detect association between maternal age (adult or teenager) and independent variables and $p < 0.05$ was considered statistically significant. Due to the absence of information for certain variables, some tables had the sample size corrected. Data were analyzed using SPSS statistical software version 21.0 (SPSS, Inc.).

## Results

Of 109 pregnant women with twin pregnancy, 101 were adult and eight were teenagers, with a mean age of 28.3 years (SD = 5.1) for adults and 16.2 years (SD = 1.9) for teenagers. Mean menarche was 12.7 years (SD = 1.80) and first sexual intercourse at 17.4 years (SD = 3.3). The matched range inter gestational was 62.3 months (SD = 51.1) and inter pregnancy was 70.0 months (SD = 51.4). The first prenatal visit occurred at a mean gestational age of 17.5 weeks (SD = 6.9).

Both adults and teenagers were similar with respect to pre-pregnancy BMI ($p = 0.709$), complications during pregnancy ($p = 0.638$), delivery and postpartum period ($p = 0.674$), total gestational weight gain adequacy ($p = 0.631$), gestational weight gain adequacy until 20 weeks ($p = 0.491$) and gestational weight gain adequacy from 28 weeks until delivery ($p = 0.417$), gestational age at birth ($p = 0.791$), type of delivery ($p = 0.423$), birth weight (first twin $p = 0.711$; second twin $p = 0.709$) and

thus the analysis was conducted in their entirety.

Most pregnant were married or in stable relationship(n = 68; 63.0%), had more than 11 years of education (n = 65; 59.6%) and worked outside the home(n = 89; 82.4%). Licit or ilicit drugs consumption were detected for (n = 26; 24,3%) pregnant women, alcohol (n = 14; 53.8%), smoking alone(n = 4; 15.4%) and smoking combined with other drugs, such as cocaine and crack (n = 8; 30.8%).

Obstetrical and clinical characteristics of pregnant twins are described in (Table 1). The personal history of multiple births was present in only (n = 5; 5.5%) of pregnant women, while the family history was positive for most pregnant women (n = 60; 55.6%) in which uncles or aunts were the most referenced relatives (n = 26; 44.8%). The most prevalent type of twin pregnancy was dichorionic - diamniotic, present in (n = 60; 55.0%) of cases and (n = 109; 100%) of the pregnancies were naturally conceived twins.

Table 1: Obstetrical and clinical characteristics of twin pregnancies. Rio de Janeiro, RJ, Brazil, (2011-2013).

| Obstetrical and clinical characteristics | n | % | Mean(SD) |
|---|---|---|---|
| Menarche (years) | 106 | - | 12,7(1,8) |
| First sexual intercourse (years) | 106 | - | 17,4(3,3) |
| Intergestational range (months) | 65 | - | 62,3(51,1) |
| Interval between births (months) | 65 | - | 70,0(51,4) |
| Number of pregnancies (n = 109) | | | |
| Primiparous | 42 | 38,5 | 2,1(1,2) |
| Multiparous | 67 | 61,5 | |
| Previous miscarriage (n = 109) | | | |
| Yes | 27 | 24,8 | - |
| No | 82 | 75,2 | |
| Previous twinning (n = 109) | | | |
| Yes | 6 | 5,5 | - |
| No | 103 | 94,5 | |
| Family history of twinning (n = 108) | | | |
| Yes | 60 | 55,6 | - |
| No | 48 | 44,4 | |
| Presence of chronic disease previous to pregnancy (n = 107) | | | |
| Yes | 30 | 28,0 | - |
| No | 77 | 72,0 | |
| Type of twin pregnancy (n = 109) | | | |
| Monochorionic / Monoamniotic | 3 | 2,8 | - |
| Monochorionic / Diamniotic | 46 | 42,2 | |
| Dichorionic / Diamniotic | 60 | 55,0 | |
| Clinical and obstetric complications during pregnancy (n = 109) | | | |
| Yes | 93 | 85,3 | - |
| No | 16 | 14,7 | |

Gestational complications were present in (n = 93; 85.3%) of cases among which anemia (n = 49; 44.9%) and HDDP (n = 31; 28.4%) were the most frequent.

Anemia was more prevalent at 20-28 weeks gestational period(n = 30; 61.2%) and the mean hemoglobin was 10.7 mg/dL (SD = 0.8).

Among the reported HDDP, preeclampsia (PE) was the most frequent (n = 18; 58.1%), followed by gestational hypertension (n = 7; 22.6%) and PE superimposed on chronic hypertension (n = 6; 19.3%). The beginning of HDDP was more often after 28 weeks (n = 26; 83.7%) and the mean gestational age 32.9 weeks (SD = 4.2). Childbirth and / or the postpartum period, the report of hypertensive peaks were identified in (n = 16; 14.7%) of the entire sample corresponding complication of those who had HDDP.

The twin pregnant women received an average of 9.1 prenatal visits (SD = 3.4) of which (n = 88; 80.7%) attended six or more visits. It was observed that (n = 82; 75.2%) of pregnant women were accompanied by a dietitian and the average number of visits was 3.5 (SD = 2.2) and (n = 47; 57.3%) had less than four visits. Mean gestational age at delivery was 35.7 weeks (SD = 3.1) and prematurity was observed in (n = 57; 52.3%) of twin pregnancies. The most frequent type of delivery was cesarean(n = 101; 92.7%).

Anthropometric characteristics of twin pregnancy are described in (Table 2). Only one pregnant woman (n = 1; 0.9%) was classified as low pre-pregnancy weight and total gestational weight gain were insufficient for most of the sample (n = 67; 62.6%).

**Table 2:** Anthropometric and nutritional characteristics of twin pregnancies. Rio de Janeiro, RJ, Brazil (2011-2013).

| Anthropometric and nutritional characteristics | n | % | Mean(SD) |
|---|---|---|---|
| Prepregnancy weight (kg) | 107 | - | 66,2(14,2) |
| Height (m) | 109 | - | 1,6(0,1) |
| **BMI pre pregnancy classification (n = 107)** | | | |
| Low weight | 1 | 0,9 | 25,5 (5,0) |
| Eutrophy | 57 | 53,3 | |
| Over wheight | 31 | 29,0 | |
| Obesity | 18 | 16,8 | |
| **Total GWG (n = 107)** | | | |
| Insufficient | 67 | 62,6 | 14,8 (6,4) |
| Adequate | 26 | 24,3 | |
| Excessive | 14 | 13,1 | |
| **Adequacy of GWG until 20 weeks (n = 84)** | | | |
| Insufficient | 69 | 82,1 | 0,3(0,2) |
| Adequate | 8 | 9,5 | |
| Excessive | 7 | 8,3 | |
| **Adequacy of GWG between 20 - 28 weeks (n = 92)** | | | |
| Insufficient | 43 | 46,7 | 0,6(0,3) |
| Adequate | 34 | 37,0 | |
| Excessive | 15 | 16,3 | |
| **Adequacy of GWG between 20 weeks until delivery (n =101)** | | | |
| Insufficient | 36 | 35,6 | 0,6 (0,4) |
| Adequate | 9 | 8,9 | |
| Excessive | 56 | 55,4 | |
| Ante partum weight or in the last visit of PN (kg) | 108 | - | 80,9(14,0) |

Legend: BMI (Body Mass Index); GWG (Gestational Weight Gain); PN (Prenatal).

Vitamin and mineral supplements were prescribed for most pregnant women (n = 86; 95.6%), being the most common iron and folic acid. The consumption of multivitamin supplements was identified in only (n = 4; 4.4%) women The average dose, adherence and time of use were not identified due to lack of information in the medical records.

## Discussion

Pregnancy is a period of biological vulnerability and can be considered as one of the most important in the human life. Nutritional needs are high, resulting from physiological adjustments to enable fetal growth and development. Given the complexity of twin pregnancies and the high impact on maternal and fetal morbidity and mortality compared with singleton pregnancies, prenatal and nutritional assistance are made even more important[14].

Advancing maternal age was observed in approximately one third of the sample and is related to the occurrence of multiple births and adverse effects on fetal development. In São Paulo, Brazil, Colleto demonstrated that increased maternal age, or 29.6 years (SD = 4.9) was significantly associated (p <0.001) with twin pregnancies compared to singleton pregnancies. The results of this study corroborate the findings of Assunção who reported 42.2% of twin pregnant women over 30 years and mean maternal age of 29.1 years in a sample of 289 pregnancies. In another

Brazilian study in Pelotas, Rio Grande do Sul, women aged more than 30 years had higher rates of twin (n = 62; 41.8%) compared to singleton pregnancies (n = 5033; 30.4%) [15,16,4].

Adult and teenage women were similar according to maternal and neonatal characteristics. However, women over 40 years have higher risk for pregnancy complications in multiple pregnancies, like hypertension, excessive bleeding and cervical incompetence than those under 40 years, as shown by Luke and Brown[17].

Brown and black skin colors were associated with twinning. Maximiano found similar results (54.4%) a population of twin mothers in the city of Rio de Janeiro. In a historical cohort of the United States of America (USA) (Baltimore, Maryland, Miami, Florida, Ann Arbor, Michigan), consisting of 646 twin pregnant, Luke and colleagues found a different result from our, with lower frequency of non-white women (45%), compared white Hispanic (18%) or not (37%) [18-19].

All twin pregnancies evaluated were due to natural conception which differs greatly from literature. Pregnancies conceived artificially in the United States are around 18% of all multiple pregnancies (including induction of ovulation and in vitro fertilization). This can be explained by the characteristics of the assisted women in the maternity where the study was conducted, who does not have access to assisted reproduction techniques [20].

The type of twin pregnancy is an important factor for obstetric outcome. In this study, it was identified that most were dichorionic type and diamniotic. The findings corroborate the findings of the Assunção who showed60.5% of twin pregnancies as dichorionic. The monochorionic are less frequent and have association with increased morbidity and mortality, especially due to complications such as Fetus-Fetal Transfusion Syndrome (FFTS) and intrauterine growth restriction (IUGR) than dichorionic [16,21].

The presence of clinical and obstetric complications prior to pregnancy was identified in 27.5% of pregnant women, and chronic hypertension and thyroid diseases were the most frequent. Similar result was described by Assunção who showed 30.8% of previous diseases, like heart disease, lung disease and chronic hypertension, which require intensive care due to increased risk of morbidity and mortality [16].

According to the American College of Obstetricians and Gynecologists, some clinical complications are more common in multiple pregnancies compared to singleton pregnancies, such as hyperemesis, gestational diabetes mellitus, hypertension, anemia, bleeding, cesarean section and postpartum depression. In this study, pregnancy complications were common and the most frequent were anemia and HDDP [5]. Maximiano showed similar findings, but the frequencies were below than those described for anemia (39.2%) and hypertension (12.6%). Assunção described 28% of hypertension and 13.5% of premature rupture of membranes[16,18].

The identification of pregnancy complications such as anemia and HDDP is essential to the perinatal development. The patients who presented such complications need specialized obstetrical and nutritional care to prevent or minimize adverse perinatal outcomes.

The HDDP occurs in the range of 12.9% to 37.0% in twin pregnancy and it is more frequent than in singleton pregnancies [22]. Multiple pregnancy is the main risk factor for gestational hypertensive syndrome, along with high parity, black race and age under 17 years, which increase the incidence and severity of hypertensive disorders and, in contrast, smoking, low income, inheritance and zygosity tend to represent a negligible effect [23]. The excess of trophoblastic tissue, and excessive production of angiostatic factors comprise the metabolic changes related to the development of preeclampsia and, beyond this, a usual clinical parameter would be the increase of uric acid from 32-34 gestational weeks that is associated with elevated blood pressure in twin pregnancies[23,24].

Anemia has been proved to be the most frequent pregnancy complication. In the study reported in Assunção the frequency was (n = 4; 1,4%) while Maximiano reported that 39.2%. The high prevalence of anemia in multiple pregnancy is due to hemodilution during pregnancy. Kraftt and colleagues[25] refer that the hemoglobin cutoff point used for the definition of gestational anemia were determined from single pregnancies, which can overestimate the diagnosis, because the hemodilution in multiple pregnancies is more intense [16-18].

Most twin pregnant women attended six or more obstetric consultations during the prenatal, recommended by the Ministry of Health [12]. The appropriate number of visits consists of six or more, however, for high-risk pregnant women, this figure rises because the visits should be monthly until 28 weeks, fortnightly between 28 and 36 weeks and weekly until term [12].

Prematurity was observed in 52.3% of twin pregnancies and cesarean delivery occurred in almost all samples(n = 101; 92.7%). A retrospective study showed that there is a higher risk of complications as the gestational age increases and a decrease in morbidity and mortality between 36 and 38 weeks , which may justify the earlier pregnancy interruption. Doss and colleagues concluded in a retrospective study of 377 twin pregnancies, that the best gestational age for twin birth would be up to 38 weeks, due to lower rates of morbidity and mortality[26,27]. Studies are controversial regarding the mode of delivery, but the highest incidence of caesareans may be due to gestational age and fetal presentation, and the chances of choosing this route is 8.3 times higher in multiple births, according to a Brazilian research[27].

Considering the nutritional characteristics, the mean pre-pregnancy BMI was 25.5kg/m$^2$ and most women (n = 57; 53,3%) had a normal pre-pregnancy BMI. The mean BMI in the study of Colleto and Segre in a sample of 381 pregnant women from São Paulo, was 21.85kg/m$^2$ (SD = 2.99), different from that observed in the present study[28]. Luke and colleagues analyzed a historical cohort of 646 pregnant women in the US and detected 50% of normal weight, similar to the findings presented [29].

Most women had insufficient total weight gain (n = 67;

62.6%) with an average of 14.8kg. Luke showed that the weight gain between 20 and 28 gestational weeks gestation is strongly related to birth weight of twins [30]. Every kilogram of maternal weight gain in the beginning of pregnancy up to 20 weeks, from 20 to 28 weeks and from 28 weeks until delivery represent, respectively, represents an increase of 65, 37 and 16 grams in birth weight of multiple newborns. The insufficient gestational weight gain increases the risk of preeclampsia and low birth weight The high energy and specific nutrient demands need to be met to promote good perinatal outcome [19,30].

Supplementation of vitamins and minerals is still rarely addressed in studies with twin pregnancy. However, because of high nutritional demand, it is recommended special attention to nutrients like calcium, phosphorus, magnesium, copper, vitamins D, C, B6, niacin, acid folic acid and iron [31]. The supplementation of iron and folic acid was reported by 95.6% of the sample, however the use of multiple vitamins and minerals was much lower (n = 4; 4.4%).

Nutritional assessment and education are important components for prenatal care in multiple pregnancies. Nutritional counseling is an important tool to maximize adequate food intake and gestational weight gain. The objectives of nutritional care in multiple pregnancies are: promote proper fetal growth and development, reduce the incidence of obstetric complications, extend the gestational age of the birth, and avoid excessive weight gain and postpartum weight retention.

## Conclusion

This study aims to contribute to understanding of the characteristics of twin pregnancy with respect to prenatal care and nutritional monitoring. The multiparty, skin color, family history of multiple births, and maternal age are important factors for twin pregnancies, as described in the literature. The inadequate total weight gain shows the need for nutritional care during pregnancy. Gestational complications should be diagnosed because they represent maternal and fetal risk. Prematurity and birth type cesarean were frequent and should be considered in order to minimize complications and promote a favorable obstetric outcome.

Elucidating the particularities involving twin pregnancy enable the development of strategies for nutritional assistance and prenatal more reliable. Interventionist studies are needed to better understand the performance of nutritional monitoring and food intake in this population and its possible consequences on the obstetric outcome.

## Acknowledgments

The authors' contributions are as follows: N.F.A.A., C.S. and E.M.A.L. contributed to the study design and data analyses; N.F.A.A. was the principal investigator and contributed to the study design and interpretation of the findings and wrote the manuscript; N.F.A.A., S.P.H., A.C.S.P., C.F.M.G., C.S. and E.M.A.L. contributed to the study design, subject briefings and data collection. All authors read and approved the final version of the manuscript.

## 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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