Residência RP Pediátrica
Publicação Oficial da Sociedade Brasileira de Pediatria
ISSN-Online: 2236-6814

Submitted on: 02/18/2020
Approved on: 04/07/2020

ORIGINAL ARTICLE

Profile of prematurity and neonatal weight adequacy in maternity of Minas Gerais and parallel with medical literature

Raisa Rios Lodi Guedes[1], João Marcos Arantes Soares[1], Melina de Barros Pinheiro[1], Jussara Soares Fontes[1]

Headings:
Gestational Age, Infant, Small for Gestational Age, Infant, Low Birth Weight, Infant, Very Low Birth Weight, Infant, Premature, Infant, Extremely Low Birth Weight.

Abstract

Objectives: Newborns at both ends of the growth curve are at increased risk for perinatal morbidity and mortality. These newborns usually are associated with prematurity and low birth weight. During clinical practice, failure to recognize these neonates can compromise their treatment and lead to future complications. The objective of this study was to evaluate the classification of neonates in the studied hospital regarding weight adequacy and maturity and to compare it with medical literature estimates. **Methods:** This is a cross-sectional, descriptive, and retrospective study. We analyzed birth weight and gestational age of newborns in a Minas Gerais maternity for two months to describe the profiles of weight adequacy for gestational age at birth and its maturity, using the growth curves of Intergrowth-21 as a reference, and compare them with other studies. **Results:** For maturity, 11.4% of newborns were premature, 88.1% at term, and 0.4% post-term. Small for gestational age (SGA) were 8.4% and large for gestational age 14.2%. Low birth weight newborns were 9.9%, macrosomic 4.9%. The studied hospital had higher values for the total (p<0.001) and full-term (p<0.001) low birth weight concerning the Intergrowth-21 study, but no significant results when concerning prematurity (0.07) and other studies. **Conclusion:** The values found were not significantly different, in most cases, from estimates of the literature, considering the same characteristics. Knowing the profile of a reference maternity in Minas Gerais is essential to recognize problems early and optimize the interventions offered and thus meet the real demands of this population.

[1] Hospital São João de Deus, Pediatrics Residency - Divinópolis - Minas Gerais - Brazil.

Correspondence to:
Raisa Rios Lodi Guedes.
Hospital São João de Deus. Rua do Cobre, nº 800, São João de Deus, Divinópolis, MG, Brazil. CEP: 35500-227. E-mail: raisarlg@gmail.com

Residência Pediátrica; 2022: Ahead of Print.
DOI: 10.25060/residpediatr-2022.v12n1-265

This work is licensed under a Creative Commons Attribution 4.0 International License.

INTRODUCTION

Globally, there are approximately 4 million neonatal deaths per year. Of these, at least 60% are associated with neonates with intrauterine growth restriction (IUGR), with low birth weight, who had premature delivery or genetic alterations[1]. There are still 48% of neonates not weighed at birth in the world, and therefore the percentage of low birth weight newborns (LBW) may be underestimated[2]. Considering these data, the reduction of low birth weights is among the UN's "2025 global targets for nutrition". (two) The risk assessment of the neonate should therefore be considered a priority, especially in developing countries, where 98% of these deaths occur[1].

The crossing of birth weight with gestational age reflects the duration of pregnancy and fetal growth and allows nutritional assessment of the child that is born. NBs at the extremes of growth curves have long been recognized in the literature as being more prone to perinatal mortality and morbidity[3–6]. The classification derived from this cross also influences the child's treatment and the parents' expectations[6]. In addition , several studies indicate a possible relationship between weight extremes and metabolic complications during life[2-4,7]. It is also necessary to consider the use of this classification in public health – governments and international agencies use growth curves and classifications derived from them to assess and monitor population well-being, formulate health policies and interventions, among others[5].

The neonate's weight adequacy is based on an inference between individual weight and gestational age: small for gestational age (SGA), adequate for gestational age (AGA) and large for gestational age (LGA) neonates[3,9,12,13]. SGA neonates are considered in the literature as neonates with a birth weight less than the 10th percentile, or, more recently, the neonate whose birth weight and/or length is less than 2 standard deviations below the population mean for your gestational age[3,9,12,13]. This classification does not differentiate between small for gestational age newborns for constitutional reasons - such as parental size and ethnicity, which do not present greater risks of morbidity and mortality - and newborns with IUGR, for this reason and because of their difficulty in differentiating. in clinical practice, IUGR neonates are generally identified as such by their classification as SGA[7,14,15]. Newborns with birth weights greater than the 10th percentile and less than the 90th percentile for their gestational age, or between -2 and +2 standard deviations, are considered AGA; and the RN that exceeds the 90th percentile, or above +2 standard deviations, is considered GIG[7,13,14,16–18].

Gestational age is, therefore, essential for the diagnosis of adequate birth weight, in addition to its importance for the classification of prematurity, being recommended as a parameter, first, the date of the last menstrual period (LMP), secondly, ultrasound (US) up to the 16th week of gestation and, if no such data are available, the Capurro Somatic physical examination method for children older than 28 weeks of gestational age and the New Ballard method for those younger than 28 weeks of gestational age[3,14].

In addition to the concepts presented, the RNBP concept is also used, which refers to birth weight below 2,500g. It should not be confused with the term SGA, although these conditions often overlap[2]. RNBP have a higher risk of death and perinatal complications. Its use is also important for public health, where it is considered a predictor of child survival and is related to the level of socioeconomic development and maternal and child care[2,8,19]. The percentage of underweight in a population also reflects other public health indicators, which include maternal nutrition, poor health care, and smoking. Individually , birth weight, by itself, is considered one of the most sensitive measures to assess the well-being of newborns[2,5,8].

However, there is no consensus on which curve to use, which can lead the professional to classify the newborn from outdated values or not based on evidence, with the possibility of not recognizing neonates at risk or leading to unnecessary tests and treatments. in normal newborns[6,11].

In a 2014 study in Ontario, Canada, 56.5% of the hospitals studied did not use curves to assess birth weight. Among the 37 remaining hospitals, 7 sites used more than one curve, not presenting a convention within the service[6]. It is possible to infer that the same happens in the Brazilian reality.

Growth Curves

There are several growth curves in the literature. The first curve was made in the 18th century[20]. More recent examples are that of Olsen et al, 2010[21]; Fenton and Kim, 2013[22]; and the UN growth curves. These change characteristics based on their methodology and the population studied.

There are now two strands in the medical literature. Despite being a topic that is continuously debated, there is still, within the current evidence, an answer as to what would be the best approach[15,21].

In one of the aspects, there is the need to know the anthropometric profile of each location. This aspect considers that, if local data are not used, the definition of a newborn in the SGA, AGA and LGA categories may be inappropriate due to the interference of ethnicity in the anthropometric data. Therefore, it defends the realization of local or national growth curves as ideal parameters[3,21,22].

Another aspect proposes that a global, standard chart be made, considering different ethnicities, and is the original proposal of the Intergrowth-21 study and the growth curves of the UN[5,23]. In this second aspect, it is considered that there is a possibility of mistakes in populations where lack of nutrition and poor quality of health are prevalent, which can be reflected in a growth chart, becoming the normal average without that these neonates are indeed healthy. Thus, precautions are taken so that other sources of gestational weight variations do not influence the result in the data collected, namely monitoring maternal health and nutrition during pregnancy, presenting data on NBs who are breastfed,

among others. This approach considers that we must have a graph that demonstrates how the RN "must grow" instead of considering how it "can grow"[5,15,23].

Another common problem is how to choose the curve to be used for premature neonates. The 2011 Latin American Consensus recommends that each country have its own benchmark. If there are no local data, it recommends the WHO curves for term infants and the Fenton curves for preterm infants[3]. The Brazilian Society of Pediatrics (SBP), in turn, recommends the use of the Intergrowth-21 curve in neonates aged 32 weeks or more, followed by the WHO curve after 64 postconceptional weeks[26].

- 21 is an international, multicenter and multiethnic project, conducted between 2009 and 2014, in eight urban areas, including Pelotas, Brazil. This project uses the same conceptual basis as the WHO growth curves and aims to create international standards for neonatal parameters, fetal growth, among others[1,23]. In addition, Intergrowth-21 launched a growth curve also for PTNBs from 27 weeks of gestational age, allowing the evaluation of a greater number of children[25]. Regardless of the use of global or local growth curves, monitoring the profile of the neonatal population with essential indicators for basic perinatal care is a fundamental strategy for the implementation of effective interventions, aiming at potentially better clinical practices[27].

The main objective of the study was to evaluate and compare the epidemiological profile related to nutritional status and maturity in a group of neonates from Minas Gerais, using the growth curves of Intergrowth-21 as a reference. In addition, it also intended to describe the importance of neonatal classification based on weight and gestational age and to indicate the best anthropometric curve to be used to evaluate newborns in this scenario.

METHODS

This is an observational, cross-sectional, descriptive study. The population studied was composed of newborns from the maternity ward of a medium-sized hospital in a city in the interior of Minas Gerais, with an estimated population of 1.5 million inhabitants. It has service from the single health system (SUS), agreements and private. It has rooming-in, nursery bed for intermediate care, apartments and neonatal intensive care unit.

All neonates born in this hospital between August and September 2017 were included, in a total of 464 neonates, totaling 100% of births in this period. An analysis of the age and weight of these newborns was performed, with the objective of making a weight adequacy and maturity profile, classifying them as SGA, AGA or LGA; low weight, very low weight, extremely low weight; macrosomics; preterm, term and post term.

Anthropometric assessment was performed by the nursing team during the first day of the child's birth. Weight was obtained using a properly calibrated Toledo electronic scale. The unit used was Kg. Data were manually collected by the maternity nursing team and recorded in the birth register of the maternity hospital of the hospital under study. The Intergrowth-21 growth table was chosen because it is a growth curve that encompasses different gestational ages, as it is recommended by both the Brazilian Society of Pediatrics and international institutions, in addition to having Brazilian representation in its realization, often not present. on previous curves. The weight and gestational age percentiles found from the Intergrowth-21 study, which allowed the classification of neonatal weight adequacy, are presented in the annex. These percentiles are present on the official website of the Intergrowth-21 project, https://intergrowth21.tghn.org/newborn-size-birth/.

This research is part of the project "Profile analysis of kidney injury markers and metabolic syndrome prognosis in small-for-gestational-age newborns and preterm infants younger than 34 weeks", which was presented to the ethics and research committees of the Campus Centro Oeste Dona Lindu /UFSJ and research ethics committee of the hospital involved after enrollment in Plataforma Brasil. This was duly approved under the respective opinion numbers: 1,384,630 and 1,436,310.

1. Newborns were classified between SGA, AGA and LGA, considering:

    1.1. SGA babies born weighing < 10th percentile;
    1.2. AGA those with birth weight between the 10th and 90th percentile;
    1.3. LGA birth weight > 90th percentile for gestational age.

2. Newborns were also classified as RNBP or "macrosomic". Neonates weighing more than 4,000g were considered macrosomic and neonates weighing less than 2,500g as low birth weight and subdivided as follows:

    2.1. Low birth weight: Less than 2,500g (from 1,500g to 2,499g, inclusive);
    2.2. Very low birth weight: Less than 1,500g (up to and including 1,499g);
    2.3. Extremely low birth weight: Less than 1,000g (up to and including 999g).

3. The term, preterm and postterm classification used was:

    3.1. Preterm (PTNB) newborns with less than 37 completed weeks (less than 259 days) of gestation;
    3.2. Term newborns (NTR) those from 37 weeks to 41 completed weeks (259 to 293 days) of gestation;
    3.3. Post-term those born at 42 completed weeks or more (294 days or more) of gestation.

Statistical analysis

The information collected was transcribed by the author into an Excel spreadsheet. After all newborns were transcribed, the spreadsheet was automatically converted to z-scores and percentiles by the "Neonatal Size " calculator. Calculator for newborn infants between 24+0 and 42+6 weeks gestation " available on the Intergrowth-21 website. Data were processed and analyzed using EXCEL and SPSS (Statistical Package for Social Sciences, version 25.0).

The groups of PTNB, PTNB and post-term newborns were analyzed together and then separately. The groups were classified and their percentages were compared with the values found in Brazilian and international studies. The comparison was made through bilateral hypothesis testing using the normal approximation. The significance level for the entire statistical analysis was 5%.

RESULTS

Sample Characterization

The total number of neonates during the study period was 464, 226 (48.7%) were female children and 238 (51.3%) were male. There were 8.4% of neonates classified as SGA, 77.4% AGA and 14.2% classified as LGA. Of the total number of newborns, 4.5% were macrosomic and 9.9% weighed less than 2.5 kg at birth. The mean weight was 3.15kg, with a standard deviation of 0.55kg. When considering only term neonates, the average weight was 3.25 kg. The mean weight for preterm neonates was 2.34kg and for postterm neonates 3.30kg. The minimum weight was 0.63kg and the maximum was 4.97kg.

Regarding gestational age, 11.4% were premature, 88.1% full-term and 0.4% post-term. The minimum age was 168 days (24 weeks) and the maximum was 294 days (42 weeks). The mean age was 269 days (38 weeks and 4 days), with a standard deviation of 13.5 days.

You can see this data and more details in Tables 1-3 and in Graph 1 and 2 below.

DISCUSSION

The data found were compared with the results of the intergrowth-21 project. The percentage of preterm births found was 5.5% globally and 9% in the Brazilian population[30]. There is no evidence that the proportion of 11.4% is different from the proportion of 9% (p=0.07). Still considering the data from the Intergrowth-21 study, in full-term newborns born in Brazil, the mean birth weight was 3.3 kg, which does not present a significant difference from what we found for the same population in our sample, with a mean birth weight of 3.25kg (p=0.053)[30]. Although the p-value for this particular characteristic was close to 0.05, indicating that perhaps with a larger sample the value could be significant, the difference between an RNT weighing 3.3kg or 3.25kg is not clinically relevant, the which makes us maintain the hypothesis that the values are not significant. RNBP were estimated at

Table 1. Number and proportion of newborns in a hospital in Minas Gerais, according to weight classification and gestational age at birth, Brazil, 2018.

Classification	*Neonates*	*Percentage*
PIG	39	8.4%
AGA	359	77.4%
gig	66	14,2%
RNBP	46	9.9%
extreme low weight	2	0.4%
very low weight	1	0.2%
Low weight	43	9.2%
macrosomic	21	4.5%
preterm	53	11.4%
at term	409	88.1%
Pós-termo	2	0.4%
Total	464	100%

SGA - Small for gestational age; AGA - appropriate for gestational age; LIG - Large for gestational age; RNBP - Low birth weight newborn.

Table 2. Number and proportion of full-term neonates in a hospital in Minas Gerais, according to weight classification and gestational age at birth, Brazil, 2018.

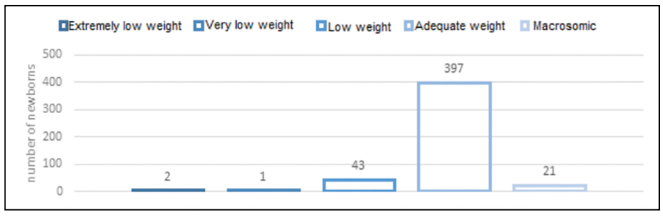
Classificação	*Neonates*	*Percentage*
PIG	33	8.1%
AGA	315	77.0%
gig	61	14.9%
RNBP	18	4.4%
Extreme low weight	0	0%
Very low weight	0	0%
Low weight	18	4.4%
Macrosomic	21	5.1%
Total	409	100%

SGA - Small for gestational age; AGA - appropriate for gestational age; LIG - Large for gestational age.

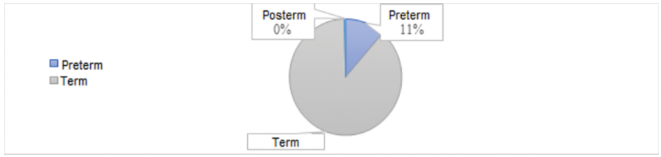
Table 3. Number and proportion of preterm neonates in a hospital in Minas Gerais, according to weight classification and gestational age at birth, Brazil, 2018.

Classificação	*Neonatos*	*Porcentagem*
PIGs	5	9.4%
AGAs	43	81.1%
gigs	5	9.4%
RNBP	28	52.8%
Extreme low weigh	2	3.8%
Very low weight	1	1.9%
Low weight	25	47.2%
Macrosomic	0	0%
Total	53	100%

SGA - Small for gestational age; AGA - Appropriate for gestational age; LIG - Large for gestational age.



Graph 1. Number of newborns in a hospital in Minas Gerais, according to birth weight classification, Brazil, 2018. Macrosomic: above 4,000 grams / Adequate weight: Between 2,500 and 4,000 grams / Low weight: Less than 2,500 grams / Very low weight: Less than 1,500 g / Extremely low weight: Less than 1,000 g.



Graph 2. Number of newborns in a hospital in Minas Gerais, according to classification of time at birth, in approximate percentages, Brazil, 2018.

5.8% in Intergrowth-21, and considering only RNT in the BP group, the value drops to 1.9%. The studied sample presents values significantly different from these proportions, 9.9% and 4.4%, respectively (p<0.001). These data are detailed in table 4 below.

Table 4. Comparison of data found in the Intergrowth-21 study and in a hospital in Minas Gerais, in approximate percentages, Brazil, 2018.

Classification	*World*	*Brazil*	*Hospital MG*	*p*
RNPT	5.5%	9%	11.4%	0.07
Less than 2,500g - Total	5.5%	5.8%	9.9%	<0.001
Less than 2,500g - Term	3.2%	1.9%	4.4%	<0.001
RNT - Mean birth weight in Kg	3.3	3.3	3.25	0.05

MG - Minas Gerais; PTNB - Preterm newborn.

Other important estimates found in the literature were also evaluated. According to UN data, there is considerable variation in the prevalence of underweight. In 2014, an estimated 15% of low birth weight children were born globally, with its highest peak, 28%, in South Asia, and 9% in Latin America[2]. The value found in the hospital studied, 9.9%, is not significantly different from the values found by the UN in Latin America (p=0.5).

The most recent Brazilian data published by DATASUS for the year 2007 reports 8.53% of low weight in Brazil and 9.1% in the Southeast region[19]. The percentage in the Southeast region is also not significantly different from that found in this sample, 9.9% (p=0.5).

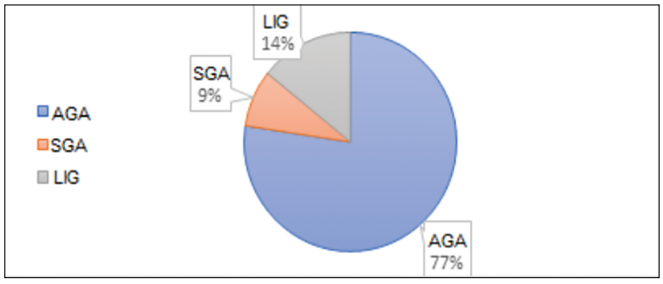
The study "Born in Brazil", carried out in 2016, estimated Brazilian prematurity at 11.5%[29] with no significant differences from the 11.4% found (p=0.94). Another previous study, from 2013, presented the percentage of PTNBs at 11.7% for the year 2010[28], also without significant differences (p=0.84).

Finally, a study estimated the number of SGA children born in 2012 in Latin America using the Intergrowth-21 standard at 8.6%, not significantly different from the value found of 8.4% (p=0.88)[29].These data can also be seen in Table 5 and Graph 3.

Table 5. Comparison of data found in the medical literature and in a hospital in Minas Gerais, in approximate percentages, Brazil, 2018.

Classification	*Study*	*Percentage*	*Hospital in MG*	*p*
BP Latin America	UN 2014	9%	9.9%	0.5
BR prematurity	NNB	11.5%	11.4%	0.9
BR prematurity	Silveira et al	11.7%	11.4%	0.8
BP southeast region BR	DATASUS	9.1%	9.9%	0.5
PIG Latin America	LEE et al	8.6%	8.4%	0.8

BP - Low Weight; BR - Brazil; MG - Minas Gerais; NNB - Born Study in Brazil; UN - United Nations; SGA - Small for gestational age.



Graph 3. Neonates at a hospital in Minas Gerais, according to birth weight adequacy classification, in approximate percentages, Brazil, 2018. SGA - Small for gestational age; AGA - Appropriate for gestational age; LIG - Large for gestational age.

It is possible to observe in the comparison with Intergrowth-21 that only the percentage of RNBP is higher in our population, with its total and only the RNT. It is important to note that the Intergrowth-21 data sample was carried out in a municipality with smaller economic discrepancies than the one studied. As a comparison, the average monthly salary of formal workers in the region of Pelotas, where the Intergrowth-21 was carried out, is 2.9 minimum wages, while the average monthly salary of these workers in Divinópolis is 2.1 minimum wages[30], which may have caused an increase in RNBP cases in the region. In addition, the difference may be due to the fact that the hospital is a reference in the region for births through the SUS, presenting a population with a lower socioeconomic level.

Comparisons between PTNB, SGA and low birth weight birth percentages in other literature did not show significant differences from what was found in this sample, which

indicates that the hospital studied is within the expected range for the Brazilian population, but, like the rest of Brazil, needs to improve access and quality of pre, post and neonatal care, thus reducing the proportions of children born in these categories.

In view of the above, we can see that the percentages of PTNB, SGA and average weight of newborns are close to the values in the literature. The percentage of RNBP is increased compared to the values found by Intergrowth-21.

As a limitation of the study, there is the possibility of errors in the collection and annotation of data by nursing, especially regarding the gestational age, for which the counting method was not detailed (whether by LMP, US or others).

As future proposals for the studied locality, we can consider methods to reduce the number of low birth weight and preterm births. These include adequate nutrition for pregnant women; the promotion of smoking cessation; improving the quality of health care and monitoring of newborns at risk[2].

It is important to implement a standard growth curve, which should be easily accessible and used by the entire team[28]. Based on the data collected and the new evidence, this study suggests the Intergrowth-21 curves as the standard curve for Brazilian newborns, both term and preterm.

Therefore, the neonatal classification must be carefully performed by the medical team and standardized according to the institution, in order to minimize complications, avoid unnecessary procedures and allow effective treatment and monitoring of these children.

REFERENCES

1. Kennedy S. The International Fetal and Newborn Growth Standards for the 21st Century - study protocol. Oxford: University of Oxford; 2008.
2. O'Brien NG, Dundon SP. Global nutrition targets 2025: low birth weight policy brief. Br Med J. 2014;4(5737):745.
3. Boguszewski MCS, Mericq V, Bergada I, Damiani D, Belgorosky A, Gunczler P, et al. Latin American Consensus: children born small for gestational age. BMC Pediatr. 2011 Jul;11:66.
4. Renz BM, Abreu K, Cunha V, Gehm LL, Souza MA, Renner FW. Prevalência de recém-nascidos pequenos para idade gestacional e fatores associados. Bol Cient Pediatr. 2015;4(1):17-21.
5. Onis M. The new WHO child growth standards. Acta Paediatr [Internet]. 2006; [citado 2019 Ago 07]; 95(Supl 1):13-7. Disponível em: http://hpps.kbsplit.hr/hpps-2008/pdf/dok03.pdf
6. Bartsch E, Booth M, Park AL, Ray JG. A survey of birthweight percentile curves used in hospitals across Ontario. Paediatr Child Heal. 2014 Nov;19(9):e119-e20.
7. Rodrigues FP, Martinelli S, Bittar RE, Francisco RPV, Zugaib M. Comparison between two growth curves for small forgestational age diagnosis. Rev Bras Ginecol Obstet. 2015 Fev;37(2):59-63.
8. Malin GL, Morris RK, Riley R, Teune MJ, Khan KS. When is birthweight at term abnormally low? A systematic review and meta-analysis of the association and predictive ability of current birthweight standards for neonatal outcomes. BJOG. 2014 Abr;121(5):515-26.
9. Pedreira CE, Pinto FA, Pereira SP, Costa ES. Birth weight patterns by gestational age in Brazil. An Acad Bras Ciênc. 2011 Jun;83(2):619-25.
10. World Health Organization (WHO). WHO recommendations on interventions to improve preterm birth outcomes [Internet]. Geneva: WHO; 2019 Nov; [acesso em 2019 Ago 06]. Disponível em: https://www.who.int/reproductivehealth/publications/maternal_perinatal_health/preterm-birth-guideline/en/
11. Mokuolu OA, Adesiyun OO, Suleiman MB, Bello M. Intrauterine growth standards: a cross-sectional study in a population of Nigerian newborns. Pediatr Rep [Internet]. 2012 Set; [citado 2019 Ago 6]; 4(3):e29. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/25396034
12. Anderson NH, Sadler LC, McKinlay CJD, McCowan LME. Intergrowth-21st vs customized birthweight standards for identification of perinatal mortality and morbidity. Am J Obstet Gynecol [Internet]. 2016 Abr; [citado 2019 Ago 06]; 214(4):509.e1-509.e7. Disponível em: https://www.sciencedirect.com/science/article/pii/S000293781502236X?via%3Dihub
13. Kliegman R, Stanton B, Behrman RE, St Geme JW, Schor NF, Nelson WE, Waldo E. Nelson textbook of pediatrics. 20ª ed. Amsterdam: Elsevier; 2016;
14. Mandy G. Infants with fetal (intrauterine) growth restriction. UpToDate [Internet]. 2017 Out; [acesso em 2019 Ago 07]. Disponível em: https://www.uptodate.com/contents/infants-with-fetal-intrauterine-growth-restriction/print
15. Bertino E, Milani S, Fabris C, Curtis M. Neonatal anthropometric charts: what they are, what they are not. Arch Dis Child Fetal Neonatal Ed [Internet]. 2007 Jan; [citado 2019 Ago 07]; 92:F7-F10. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/17185434
16. Madeira IR. Inadequação do peso ou do comprimento para a idade gestacional. Resid Pediatr. 2015;5(1):1-13.
17. World Health Organization (WHO). International classification of diseases (ICD-11) [Internet]. Geneva: WHO; 2019; [citado 2019 Ago 09]. Disponível em: https://www.who.int/classifications/icd/en/
18. Mandy GT. Large for gestational age newborn. UpToDate [Internet]. 2017 Out; [citado 2019 Ago 07]. Disponível em: https://www.uptodate.com/contents/large-for-gestational-age-newborn
19. Ministério da Saúde (BR). Proporção de nascidos vivos de baixo peso ao nascer. Brasília (DF): Ministério da Saúde; 2012.
20. Cole TJ. The development of growth references and growth charts. Ann Hum Biol. 2012 Set;39(5):382-94.
21. Olsen IE, Groveman SA, Lawson ML, Clark RH, Zemel BS. New intrauterine growth curves based on United States data. Pediatrics [Internet]. 2010 Feb [cited 2022 Mar 30];125(2). Available from: https://pubmed.ncbi.nlm.nih.gov/20100760/
22. TR F, JH K. A systematic review and meta-analysis to revise the Fenton growth chart for preterm infants. BMC Pediatr [Internet]. 2013;13:59. [cited 2022 Mar 30] Available from: http://www.epistemonikos.org/documents/33c260d38ee00a519c96149779a8bd1194d0042a
23. Giuliani F, Ohuma E, Spada E, Bertino E, Al Dhaheri AS, Altman DG, et al. Systematic review of the methodological quality of studies designed to create neonatal anthropometric charts. Acta Paediatr. 2015 Out;104(10):987-96.
24. Liu S, Metcalfe A, León JA, Sauve R, Kramer MS, Joseph KS. Evaluation of the intergrowth-21st project newborn standard for use in Canada. PLoS One. 2017;12(3):e0172910.
25. Villar J, Altman DG, Purwar M, Noble JA, Knight HE, Ruyan P, et al. The objectives, design and implementation of the INTERGROWTH-21 st Project. BJOG. 2013 Set;120(Supl 2):9-26.
26. Riii C, Barros FC, Moreira E. Monitoramento do crescimento de RN pré-termos. Rio de Janeiro: Sociedade Brasileira de Pediatria (SBP); 2017.
27. Villar J, Giuliani F, Fenton TR, Ohuma EO, Ismail LC, Kennedy SH. Intergrowth-21st very preterm size at birth reference charts. Lancet. 2016 Fev;387(10021):844-5.

28. Villar J, Ismail LC, Victora CG, Ohuma EO, Bertino E, Altman DG, et al. International standards for newborn weight, length, and head circumference by gestational age and sex: the newborn cross-sectional study of the intergrowth-21st project. Lancet. 2014 Set;384(9946):857-68.

29. Leal MC, Esteves-Pereira AP, Nakamura-Pereira M, Torres JA, Theme-Filha M, Domingues RMSM, et al. Prevalence and risk factors related to preterm birth in Brazil. Reprod Health [Internet]. 2016 Out; [citado 2019 Ago 14]; 13(Supl 3):127. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/27766978

30. Silveira MF, Matijasevich A, Horta BL, Bettiol H, Barbieri MA, Silva AA, et al. Prevalence of preterm birth according to birth weight group: a systematic review. Rev Saúde Pública. 2013;47(5):992-1003.

31. Lee AC, Kozuki N, Cousens S, Stevens GA, Blencowe H, Silveira MF, et al. Estimates of burden and consequences of infants born small for gestational age in low and middle income countries with Intergrowth-21st standard: analysis of CHERG datasets. BMJ [Internet]. 2017 Ago; [citado 2019 Ago 15]; 358:j3677. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/28819030

32. Instituto Brasileiro de Geografia e Estatistica (IBGE). Cidades - Panorama [Internet]. Brasília (DF): IBGE; 2010; [acesso em 2019 Ago 28]. Disponível em: https://cidades.ibge.gov.br/brasil/panorama