

PERINATAL OUTCOMES OF ADOLESCENT AND ADULT MOTHERS: A SYSTEMATIC REVIEW

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ABSTRACT: Objective: To identify and analyze studies published in the literature that researched adverse perinatal outcomes in live births to adolescent and adult mothers. Methods: The electronic databases PubMed and VHL (LILACS and MEDLINE) were consulted, using the MeSH descriptors with Boolean operators were used, which were grouped as follows: (“maternal age”) AND (“risk factors”) AND (“Pregnancy Complications OR “Adverse Birth Outcomes” OR “Perinatal outcome”). This analysis resulted in eight articles published between 2018 and 2022. Results: Studies presented a strong association between young maternal age (<20 years) and unfavorable neonatal outcomes, such as low birth weight, premature delivery, need for oxygen therapy and admission to the Neonatal Intensive Care Unit. No significant data were found on adverse outcomes in pregnancies in the optimum age range (20>35 years). Conclusion: The analyzed studies point to a strong association between young maternal age and some clinical-obstetric complications.

KEYWORDS: Maternal Age; Pregnancy in Adolescence; Perinatal Care.

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RESULTADOS PERINATAIS DE MÃES ADOLESCENTES E ADULTAS: UMA REVISÃO SISTEMÁTICA

RESUMO: Objetivo: Identificar e analisar estudos publicados na literatura que pesquisaram desfechos perinatais adversos em nascidos vivos de mães adolescentes e adultas. Métodos: Foram consultadas as bases de dados eletrônicas PubMed e BVS (LILACS e MEDLINE), utilizando-se os MeSH descritores com operadores booleanos, os quais foram agrupados da seguinte forma: (“maternal age”) AND (“risk factors”) AND (“Pregnancy Complications OU “Resultados adversos do parto” OU “Resultados perinatais”). Essa análise resultou em oito artigos publicados entre 2018 e 2022. Resultados: Os estudos apresentaram forte associação entre a idade materna jovem (<20 anos) e os desfechos neonatais desfavoráveis, como baixo peso ao nascer, parto prematuro, necessidade de oxigenoterapia e internação na UTI neonatal. Não foram encontrados dados significativos sobre resultados adversos em gestações na faixa etária ideal (20>35 anos). Conclusão: Os estudos analisados apontam para uma forte associação entre idade materna jovem e algumas complicações clínico-obstétricas.

PALAVRAS-CHAVE: Idade Materna; Gravidez na Adolescência, Assistência Perinatal.

RESULTADOS PERINATALES DE MADRES ADOLESCENTES Y ADULTAS: UNA REVISIÓN SISTEMÁTICA

RESUMEN: Objetivo: Identificar y analizar estudios publicados en la literatura que investigaran resultados perinatales adversos en nacidos vivos de madres adolescentes y adultas. Métodos: Se realizaron búsquedas en las bases de datos electrónicas PubMed y BVS (LILACS y MEDLINE) utilizando los descriptores MeSH con operadores booleanos, que se agruparon de la siguiente manera: ("edad materna") AND ("factores de riesgo") AND ("complicaciones del embarazo OR "resultados adversos del parto" OR "resultados perinatales"). Este análisis dio como resultado ocho artículos publicados entre 2018 y 2022. Resultados: Los estudios mostraron una fuerte asociación entre la edad materna joven (<20 años) y los resultados neonatales desfavorables, como bajo peso al nacer, parto prematuro, necesidad de oxigenoterapia e ingreso en la UCI neonatal. No se encontraron datos significativos sobre resultados adversos en embarazos en el grupo de edad ideal (20>35 años). Conclusión: Los estudios analizados apuntan a una fuerte asociación entre la edad materna joven y algunas complicaciones clínico-obstétricas.

PALABRAS CLAVE: Edad Materna; Embarazo Adolescente, Cuidados Perinatales.

1. INTRODUCTION

Pregnancy is an important and complex phase for women, which is necessarily interconnected with integrated dimensions, such as physiology, neurobiology, epigenetics, mental health and socioeconomic and/or sociodemographic aspects. In this sense, it is important to highlight the range of knowledge that is involved in the function of increasingly describing and elucidating the gestational period (MALDONADO, 2017).

In general, the central objective of health research on this topic is to expand knowledge on the multiple factors that may contribute to a successful pregnancy and to identify risk factors that may be associated with unfavorable perinatal outcomes (DIAS *et al.*, 2010; DIAS; ANTONI e VARGAS, 2020).

It is estimated that around three hundred million women face pathological complications in the short and/or long term due to factors that directly interfere with pregnancy and childbirth, moments that are decisive in the well-being of the binomial. This rate is mainly related to the increase in the incidence of pregnancies at the extremes of the maternal reproductive age group, which corresponds to the age groups under 20 years and over 35 years of age, since these, in comparison with the 20–35-year age group, result in adverse outcomes for mothers and their babies (SANTOS *et al.*, 2014).

In 2019, Brazil recorded 419,252 adolescent pregnancies (aged 10-19 years); 19,330 aged 10-14 years and 399,922 aged 15-19 years (FEBRASGO, 2021). Adverse outcomes of adolescent pregnancy are important public health problems with significant social impact. Socioeconomic and sociodemographic aspects need to be mentioned. Adolescent pregnancy, for example, is a phenomenon observed with overwhelming frequency in developing countries, especially in those marginalized places where there is also low level of education (BLUM; GATES, 2015; CECAGNO *et al.*, 2020).

It is worth noting that maternal age may be associated with adverse outcomes for both mother and baby. Low birth weight, oxygen therapy, prematurity, neonatal sepsis, and admission to the intensive care unit are some of the complications observed in live births to women under the age of 20 years (GIBBS *et al.*, 2022). Thus, the present study aimed to search and analyze studies published in the literature presenting adverse perinatal outcomes of live births to adolescent and adult mothers.

2. MATERIALS AND METHODS

2.1 First Steps, Search Criteria and Selection of Studies

This is a systematic review of the literature, following the parameters established by the Cochrane Handbook for Systematic Reviews (COCHRANE, 2019). It is of the descriptive type since it is a study which proposes to research the features of a specific phenomenon and, from this, collect information which concerns certain characteristics, such as age distribution, gender prevalence and origin (GIL, 2010). For reporting the results, guidelines based on the PRISMA Checklist were followed. First, according to the

initial research question, the PECO(s) search strategy was developed, which is described in Table 1. The search strategy was guided by the PECO(s) acronym, which replaces the letter I (Intervention) with the letter E (Exposure).

Table 1 – Search strategy description PECO(s).

P (Population)	Neonates
E (Exposure)	Clinical-obstetric conditions of neonatal risk related to maternal age
C (Comparison)	Maternal age (adolescents and adults)
O (Outcomes)	Preterm delivery, birth weight, oxygen therapy and neonatal sepsis
S (Study type)	Experimental and observational

Source: Prepared by the authors.

The research question was “What are the adverse perinatal outcomes of neonates to adolescent and adult mothers?” The search began on September, 2022, and the databases chosen to conduct the search were PubMed Central and Virtual Health Library (VHL), selecting LILACS and MEDLINE. MeSH descriptors with Boolean operators were used, which were grouped as follows: (“maternal age”) AND (“risk factors”) AND (“Pregnancy Complications” OR “Adverse Birth Outcomes” OR “Perinatal outcome”).

2.2 Inclusion Criteria

Those studies that 1) were published in article format; 2) research conducted with human beings; 3) published in Portuguese or English; 4) published between 2018 and 2022; 5) studies that discussed perinatal outcomes; 6) peer-reviewed publications; 7) observational or experimental studies that had as population: pregnant women aged less than 20 years and pregnant women aged 20>35 years met eligibility criteria.

2.3 Exclusion Criteria

Literature reviews; animal studies; publications not available as full text; repeated studies in databases; publications in book format, theses, and dissertations.

Furthermore, aiming to guarantee the homogeneity of the sample, it was also decided to discard studies that investigated perinatal outcomes from the effects of COVID-19 in adolescent and adult mothers; studies that focused on perinatal outcomes resulting from a sexually transmitted disease (STD), psychological condition and/or exposure to alcohol and other drugs.

2.4 Data and Risk of Bias Analysis

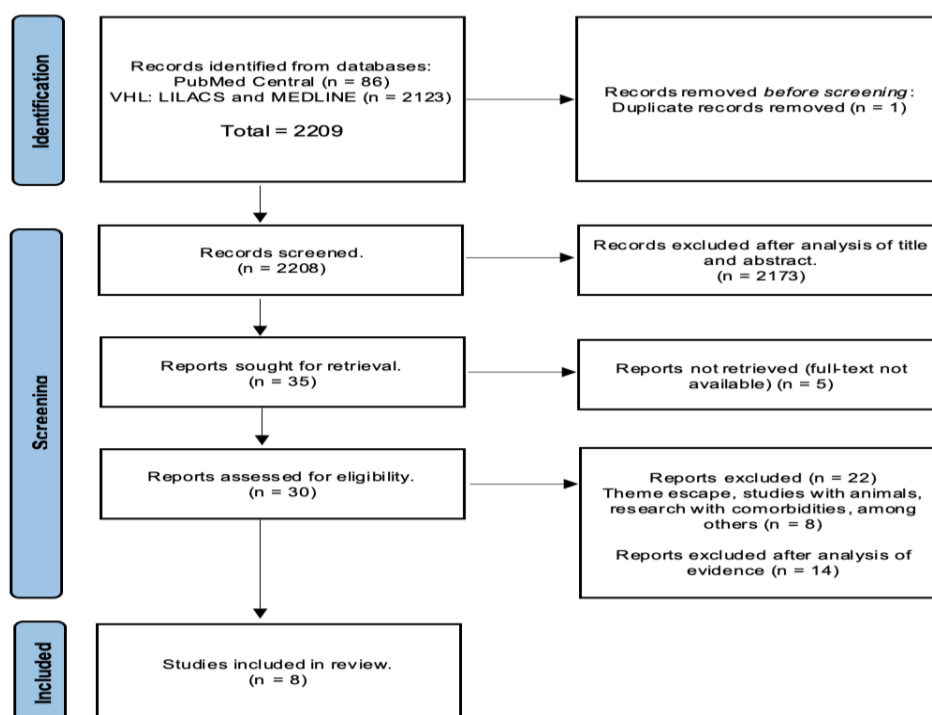
Studies were analyzed by title and abstract. Then, the remaining studies were read in full. Finally, the appraisal tool for cross-sectional studies (AXIS), a tool to assess the quality of evidence, by means of a questionnaire with twenty evaluative items; the studies needed to reach a minimum of sixteen (DOWNES *et al.*, 2016). The papers were analyzed by two reviewers and, in the studies in which there were differences regarding eligibility, this was resolved through consensus between the researchers.

After all the steps had their data extracted and compiled using Excel Software (2019). To guarantee greater control over the quality of evidence and, consequently, to increase the degree of reliability of the studies assessed and included in the review.

3. RESULTS

Twenty-two studies were identified in the period between 2018 and 2022, but only eight were included, in view of the application of the AXIS protocol for the control of evidence. Of the eight articles, four were conducted in the Asian continent (India, Taiwan, China, and Nepal), two in the African continent (Tanzania and Zambia), one in Europe (Switzerland) and one in South America (Brazil). Figure 1 illustrates the screening and selection process for articles based on the PRISMA flow diagram model.

Figure 1. Flow Chart of Study Screening and Selection Process. Flow Diagram, PRISMA 2020.



Source: Prepared by the authors.

The Table 2 characterizes the main results found in the studies included in this review, presenting: Authors; Year; Title; Country; Journal and Main Outcomes.

Table 2. General Characterization of the studies with quality of evidence.

AUTHORS AND YEAR	TITLE	COUNTRY	JOURNAL	OUTCOMES ANALYZED
YOUNES <i>et al.</i> , 2021	Incidence, Risk Factors, and Outcomes of Preterm and Early Term Births: A Population-Based Register Study	Switzerland	International Journal of Environmental Research and Public Health	Congenital anomalies, and obstetric care.
MOHAPATRA; SARAOGI & MISRA, 2022.	Demographic Profile, Etiology, and Perinatal Outcome Associated with Preterm Birth in a Tertiary Hospital of Eastern India: A Retrospective Study.	India	Cureus	Preterm delivery, admission to a neonatal intensive care unit (NICU), respiratory distress syndrome, birth asphyxia, neonatal sepsis, and jaundice.
MTONGWA, FESTO & ELISARIA, 2021	A comparative analysis of determinants of low birth weight and stunting among under five children of adolescent and non-adolescent mothers using 2015/16 Tanzania Demographic and Health Survey (TDHS).	Tanzania	BMC Nutrition	Low birth weight
TEMBO, <i>et al.</i> , 2020	The association of maternal age with adverse neonatal outcomes in Lusaka, Zambia: a prospective cohort study.	Zambia	BMC Pregnancy and Childbirth	Maternal and neonatal complications and factors associated with adverse neonatal outcomes.
GURUNG, <i>et al.</i> , 2020	The burden of adolescent motherhood and health consequences in Nepal.	Nepal	BMC Pregnancy and Childbirth	Prolonged labor, premature birth, small-for-gestational-age, and birth defects.
JIANG, <i>et al.</i> , 2018	A case control study of risk factors and neonatal outcomes of preterm birth.	Taiwan	Taiwanese Journal of Obstetrics and Gynecology	Hypertension, intrahepatic cholestasis of pregnancy (ICP), fetal growth restriction (FGR), and premature rupture of membranes (PROM).
MOREIRA; SOUSA & SARNO, 2018	Low birth weight and its associated factors.	Brazil	Sociedade Beneficente Israelita Brasileira Hospital Albert Einstein, Scientific Reports	Low birth weight
RAO <i>et al.</i> , 2018	Trend and risk factors of low birth weight and macrosomia in south China, 2005-2017: a retrospective observational study.	China	Scientific Reports	Low birth weight and macrosomia

Source: Prepared by the authors.

As shown, the articles were also analyzed using the AXIS protocol, which establishes a list of twenty criteria, such as ethical aspects, quality of the instruments used, clarity in reporting data and adequate population. The Table 3 shows data after this

analysis and it characterizes the authors, year of publication, sample size, results, and limitations of the studies.

Table 3. Analysis of the studies

AUTHORS AND YEAR	OBJECTIVE	SAMPLE SIZE	RESULTS	LIMITATIONS
YOUNES <i>et al.</i> , 2021	To assess the incidence, risk factors, and fetal-maternal outcomes of preterm births and deliveries.	15,865	Moderate-level risk for preterm delivery is associated with early age (aOR 2.76; 95% CI, 1.26, 6.07), in addition to a history of this type of delivery, congenital anomalies, and obstetric care. For adult women, no statistically significant data were found that point to a correlation between these variables.	Did not consider important socioeconomic aspects of the studied population, such as mean salary, or sociodemographic aspects, such as marital status.
MOHAPATRA; SARAOGI & MISRA, 2022.	To retrospectively evaluate sociodemographic characteristics and etiological factors associated with preterm birth and consequent adverse perinatal outcomes in a tertiary hospital.	12,345	Premature births accounted for 31.21% of all neonatal intensive care unit (NICU) admissions. Respiratory distress syndrome, birth asphyxia, neonatal sepsis and jaundice were the most common complications. Most the women belonged to the lower socioeconomic and educational strata.	Reporting bias in the study, considering the data presented and the authors themselves not pointing out methodological limitations.
MTONGWA, FESTO & ELISARIA, 2021	To explore the variation and factors associated with low birth weight and stunting among children born to adolescent and non-adolescent mothers.	13,266	14.3% of adolescent mothers and 6.3% of non-adolescent mothers gave birth to babies with low birth weight. Association between the variables was greater among unemployed adolescent mothers.	Variability in the availability of birth weight data may have influenced the results, since only 64% of live births had their birth weight recorded. The unequal sample size by maternal age may have affected the statistical power of the study, as some estimates may be over- or underreported.
TEMBO, <i>et al.</i> , 2020	To explore associations between maternal age and neonatal outcomes among pregnant women in Lusaka, Zambia.	11,501	Adolescence did not present statistically significant associations with poor maternal health outcomes. However, the risk of obstructed labor, premature rupture of membranes and postpartum hemorrhage was higher among adolescents when compared to women aged 20 to 24 years, while the risk of serious infection was lower and not significant. Adolescents were also 1.36 times more likely to have a low-birth-weight baby (95% CI 1.12, 1.66) and were at risk of preterm delivery (aOR = 1.40, 95% CI 1.06, 1.84).	Reporting bias in view of the data presented and the authors themselves not pointing out methodological limitations.
GURUNG, <i>et al.</i> , 2020	To assess the incidence, risk factors, and consequences for maternal and neonatal	60,742	Two-thirds of adolescent mothers were from disadvantaged ethnic groups compared to half of adult mothers (66.1 vs. 47.8%, $p < 0.001$). One-third of adolescent mothers had	There may have been interviewer and memory bias during data collection.

	health among adolescent mothers.		no formal education, while one in nine adult mothers had no formal education (32.6 vs. 14.2%, $p < 0.001$). Compared to adult mothers, adolescent mothers were more likely to experience prolonged labor (aOR-1.56, 95% CI, 1.17, 2.10, $p=0.003$), preterm delivery (aOR-1.40, 95% CI, 1.26-1.55, $p < 0.001$) and having a small-for-gestational-age baby (aOR = 1.38, 95% CI 1.25, 1.52, $p < 0.001$). The chances of birth defects increased more than twofold in adolescent compared to adult mothers (aOR = 2.66, 95% CI 1.12, 6.33, $p = 0.027$).	
JIANG, <i>et al.</i> , 2018	To examine the risk factors and neonatal outcomes of preterm birth and provide a basis for the prevention of premature birth	2,256	Women as young as 20 years of age had a 6.63 times greater risk of preterm birth compared with adult women (95% CI 2.22, 19.82).	Surveyed only a population of several hundred women in a single tertiary hospital. More studies, preferably large geographic prospective cohort studies, are needed to identify and characterize the underlying causes of preterm birth.
MOREIRA; SOUSA & SARNO, 2018	To calculate the frequency and assess factors associated with low birth weight.	746	The proportion of low birth weight was 7.6% (mean birth weight of 3.2 kg) and, in the multiple analysis, the presence of twinning, the age range of the pregnant women (showing protection for low birth weight between ages ≥ 18 years and < 35 years), and cesarean section were associated with low birth weight. Maternal age 20-35 years constituted risk for the primary outcome.	Small sample compared to the population base of hospital institutions.
RAO, <i>et al.</i> , 2018	To examine the secular trend of low birth weight and macrosomia in Foshan, a city located in southern China.	102,526	Maternal age 20-24 years (OR = 1.19, 95% CI 1.57, 2.67, $p < 0.001$), maternal age 25-29 years (OR = 2.78, 95% CI 2.14, 3.61, $p < 0.001$), maternal age 30-34 years (OR = 2.63, 95% CI 2.01, 3.45, $p < 0.001$), maternal age > 35 years (OR = 1.85, 95% CI 1.35, 2.46, $p < 0.001$); HDCP (OR = 5.92, 95% CI 5.35, 6.55, $p < 0.001$); diabetes (OR = 1.38, 95% CI, 1.26, 1.50, $p < 0.001$) were significant risk factors for LBW in the multiple logistic regression model.	As pointed out in the study itself, the results cannot be generalized to other cities or countries discussed in this study. In addition, the hospital's electronic information system was updated several times between 2005 and 2017, and may have an approximate error rate of 5%, with some values missing from previous data.

Source: Prepared by the authors.

Of the studies presented, three have a retrospective observational methodological design, three are documental, one is a population-based prospective cohort, and one is a

case-control study. Heterogeneity was observed regarding publication journals, with recurrence of publication only in the journal BMC Pregnancy and Childbirth, where two studies were published. 2018 was identified as the year with the most publications (3), followed by 2020 and 2021 (2) and 2022 (1).

4. DISCUSSION

From the results, it was possible to observe that there was a considerable volume of publications that discussed adverse perinatal outcomes, taking maternal age as one of the independent variables. The studies focused on research questions involving the prevalence of preterm birth (YOUNES *et al.*, 2021; MOHAPATRA; SARAOGI; MISRA, 2022; TEMBO *et al.*, 2020; GURUNG *et al.*, 2020, JIANG; MISHU; LU, 2018) low birth weight (MTONGWA; SARAOGI; MISRA, 2022; TEMBO *et al.*, 2020; MOREIRA; SOUSA; SARNO, 2018; RAO *et al.*, 2018) growth retardation (MTONGWA; FESTO; ELISARA, 2021) oxygen therapy (TEMBO *et al.*, 2020) and macrosomia (RAO *et al.*, 2018).

To facilitate the explanation of the data found in the studies, some thematic categories were created based on the main common outcomes in the analyzed studies and with other variables, which are: Preterm birth; Low birth weight and Association between age and socioeconomic and sociodemographic factors.

4.1 Preterm Birth

Premature or preterm birth is defined as the one in which the baby is born early, more precisely before the 37th week of gestation, and is responsible for perinatal morbidity and mortality rates in the world. The etiology of this type of delivery is heterogeneous, with uterine infection, preeclampsia and/or anemia being the main causes (MOHAPATRA; SARAOGI; MISRA, 2022). It is worth mentioning that, depending on the gestational age at which the preterm birth occurs, the baby may suffer from a series of developmental complications, such as visual, auditory, and brain deficiencies (GIBBS *et al.*, 2022).

The analyzed studies presented a strong association between young maternal age and the prevalence of preterm birth. The study by Younes *et al.*, (2022) categorized preterm birth as extreme (<32 weeks), moderate (32<34 weeks) and late (34<37 weeks). For extreme preterm birth, from regression analysis, it was seen that advanced maternal age

was strongly associated. Furthermore, chromosomal/congenital anomalies, preterm history and assisted pregnancy were also predictive variables in the univariate and multivariate analyses.

Young maternal age (aOR 2.76; 95% CI) was configured as a predictor in cases of moderate preterm birth, as well as having chronic hypertension, assisted pregnancy and male baby. Women of ideal and advanced age showed no significant association with the variables.

The study by Mohapatra, Saraogi and Misra (2022) presented a counterpoint to these results that confirm the initial hypothesis. The study surveyed a sample of 12,345 live births, of which 682 were premature births, demonstrating an incidence of premature birth in the population of 5.52%. On the other hand, adult maternal age showed higher frequency (n = 360, 64.98%) and young maternal age had a rate of n = 86 (15.52%), while advanced age had a frequency of 108 preterm births (19.49%).

In the other studies, adolescent mothers were 1.36 times more likely to have a baby with low birth weight (95% CI 1.12, 1.66) and were at risk for premature birth (aOR = 1.40, CI 95% 1.06, 1.84), from a sample of 11,501 women (TEMBO *et al.*, 2020). Other researchers have also published results like these, reinforcing the greater probability of premature birth in adolescents (GURUNG *et al.*, 2020; JIANG; MISHU; LU, 2018).

4.2 Low Birth Weight

The analyzed studies showed a higher prevalence rate of low birth weight in babies born to adolescent mothers. The incidence was 14.3% of adolescents against 6.3% of non-adolescent mothers, in a sample of 13,266 participants (MTONGWA; FESTO; ELISARA, 2021). In the study by Tembo *et al.*, (2020) adolescents were 1.36 times more likely to have a baby with low birth weight, in addition to the risk of prematurity, as previously described.

In the study conducted in Brazil by Moreira; Sousa; Sarno (2018), low birth weight was recorded in 140 pregnant women, from a sample of 746 pregnant women, representing, therefore, 17.6%. On the other hand, women of ideal age represented 59.1% of the total sample. However, it is emphasized that the number of pregnant women evaluated may not correspond to a sampling of the studied population base.

In China pointed out the highest prevalence among pregnant women of maternal age was between 20 and 24 years and from 30 to 34 years, in a sample of 102,525

participants (RAO *et al.*, 2018). It is important to emphasize, on the other hand, that the number of women under the age of 20 years was smaller in proportion, compared to other studies performed in underdeveloped countries. For these reasons, it is considered essential to also discuss the macrosocial factors involved in this problem in public health worldwide.

4.3 Association Between Age and Socioeconomic and Sociodemographic Factors

To broaden the contextual perspective on the multiple variables involved in the phenomenon of adolescent pregnancy, it was decided to mention some of the social determinants and conditions of health. One of them refers to socioeconomic factors, since, as shown in other studies, adolescent pregnancy occurs more frequently in developing countries, with elevated levels of poverty and low educational levels (DIAS; ANTONI e VARGAS, 2020).

Some of the studies analyzed in this review point in this direction, which demonstrate a higher prevalence of pregnant adolescents from lower economic strata, with a lower level of educational instruction (MOHAPATRA; SARAOGI; MISRA, 2022; GURUNG *et al.*, 2020).

5. CONCLUSION

The purpose of our study was to identify and analyze studies published in the literature that researched adverse perinatal outcomes of live births to adolescent and adult mothers, to assess whether maternal age could be considered an independent predictor variable for unfavorable outcomes in live births.

From the data presented in most studies, there is a strong association between young maternal age and some clinical-obstetric complications, such as preterm birth, low birth weight, growth retardation, oxygen therapy, malformations, and macrosomia.

It should be noted that this review has some methodological limitations, such as the number of databases studied, language restriction to Portuguese and English, and statistical analysis. Thus, it is suggested that more research be performed with the aim of expanding on this theme, in view of its importance for the scenario of outcomes and results of live births to adolescent and adult mothers.

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