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## RELATIONSHIP

BETWEEN OBSTETRIC COMPLICATIONS BETWEEN ADOLESCENTS AND ADULTS

## RELACIÓN ENTRE COMPLICACIONES OBSTÉTRICAS ENTRE ADOLESCENTES Y ADULTOS

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### ABSTRACT

A pregnant adolescent is classified as a woman who is between puberty (beginning of childbearing age) and the last stage of late adolescence. Preeclampsia causes a complication in pregnancy, which is characterized by increased blood pressure and proteinuria, which can be with or without signs of severity depending according to the signs and symptoms that the patient has. It occurs after 20 weeks of gestation and may appear even one day after delivery. Hypertensive disorders in pregnant women are one of the leading causes of maternal morbidity and mortality according to the WHO, especially in developing countries such as Latin America. In Ecuador, preeclampsia was declared the main cause of maternal death. Being this frequent during pregnancy, in a percentage between 2% and 25% worldwide.

**Keywords:** Preeclampsia, adolescence, pregnancy.

### RESUMEN

Una adolescente embarazada se clasifica como una mujer que se encuentra entre la pubertad (inicio de la edad fértil) y la última etapa de la adolescencia tardía. La preeclampsia provoca una complicación en el embarazo, que se caracteriza por aumento de la presión arterial y proteinuria, que puede ser con o sin signos de gravedad según los signos y síntomas que presente la paciente. Ocurre después de las 20 semanas de gestación y puede aparecer incluso un día después del parto. Los trastornos hipertensivos en mujeres embarazadas son una de las principales causas de morbilidad y mortalidad materna según la OMS, especialmente en países en desarrollo como América Latina. En Ecuador, la preeclampsia fue declarada la principal causa de muerte materna. Siendo así de frecuente durante el embarazo, en un porcentaje entre el 2% y el 25% a nivel mundial.

**Palabras clave:** Preeclampsia, adolescencia, embarazo.

## INTRODUCTION

Approximately 500,000 maternal deaths occur worldwide each year, and 10%-15% of these are preeclampsia and eclampsia. Taking as reference the period between 1994 and 2013, arterial hypertension, eclampsia, and preeclampsia have increased from 57.3 to 86.5 every 1,000 deliveries.

One of the causes of maternal and perinatal mortality worldwide is preeclampsia. In First World countries, several analyses confirm that preeclampsia has been increasing in the general population, due to diabetes, chronic hypertension, or kidney disease. An important risk factor for developing preeclampsia is nulliparity with 32.3% and it is higher in women <18 years. In women who are nulliparous and also healthy, it has an incidence of 7.5% (Solorzano et al., 2020), (Resnik et al., 2019).

In Ecuador in 2005, an investigation showed that there are 45.9 maternal deaths per 100 thousand live births (44%). In the third place with adolescent pregnancies (20.25% of births), in 2013 they were of mothers under 19 years. In 208 pregnant adolescents, it was found that they presented preeclampsia mostly at 17-18 years of age, in addition to having poor control of their pregnancy, 11 of these pregnant women had high blood pressure, 5 had preeclampsia in previous pregnancies and 3 had diabetes.

Adolescence is conceived as a stage of growth and development between the ages of 10 and 19, after childhood, and before adulthood. It is a very important process in the life of a human being. Puberty is characterized by rapid growth and rapid changes, which also occur in the prenatal stage (Teruel et al., 2014), (Palacios et al., 2021), (Rodríguez et al., 2021).

Early adolescence includes a period from 10 to 13 years, where menarche appears. At this stage, the adolescents' interest in establishing friendships with people of the same gender begins, and the concern for the physical appearance also begins.

The next stage corresponds to Middle adolescence, a period from 14 to 16 years, where their growth and body development ends. It is considered the age of beginning of sexual life, in addition to taking risks without measuring its consequences.

The third stage is known as Late adolescence and takes the period from 17 to 19 years. Here they begin to accept their body image, the importance of sexual relations is strengthened, and they form their values.

Those pregnancies in which the pregnant woman is at an age that is considered adolescent, regardless of her

gestational age (Velasteguí Egüez et al., 2018). This situation is one of the causes of maternal, perinatal, and neonatal morbidity and mortality, in addition to the social rejection that still exists. (Hevia Bernal & Perea Hevia, 2020).

About 60% of teenage pregnancies occur in the first 6 months of their active sexual life, resulting in first-time mothers between 73% and 93%. The lack of information, control, and awareness favor that more than half of the first-time adolescents become pregnant again within two years.

The numbers of pregnant adolescents are increasing progressively worldwide, and also at younger ages. For example, in the United States, there is a percentage of 12.8% of all early pregnancies, while in underdeveloped countries they double that figure (Silva, 2021).

In Latin America and the Caribbean, it is estimated that every year 2 million children are born from mothers between the ages of 15 and 19. In second place regarding the adolescent pregnancy rate worldwide, in 5 years, 66.5 births were reported for every 1,000 adolescents.

In Chile, these pregnancies are a Public Health problem because about 40,355 children are born each year, and a thousand children of women under 15 years of age. And in Ecuador, there is 3% of mothers under 15 years of age, while mothers between 15 and 17 years old belong to 23%. With a very similar percentage, mothers between 18 and 19 occupy 23.3%. Until 2019 it was shown that, out of every one hundred adolescents, 12 women between the ages of 12 and 19 are mothers. An investigation in the last 10 years, showed an increase in adolescent births between 10 and 14 years old by 78%, and between 15 and 19 years old it has a percentage of 11%. In addition to every 100 women who are mothers, 49 of them conceived their first child between the ages of 15 and 19.

## DEVELOPMENT

This study carried out a bibliographic review focused on determining risk factors in pregnant adolescents. Research data was used in several patients showing a similar incidence of complications in the pregnant adolescent compared to an adult woman.

The keywords used to search for our work were: preeclampsia, adolescence, and complications. Several documents from pages such as SciELO, FIGO (International Federation of Gynecology and Obstetrics), and projects published by the University of Cuenca were analyzed.

Several factors are denoted, such as individual risk which can lead to early menarche, abandoning education, creation of taboos along with little knowledge for family

planning. Many times this behaves like a family pattern where there are family conflicts in 33%, within the family, there is a history of adolescent pregnancies, loss of the mother or father figure and/or low education of the parents. This also includes social factors such as a low socioeconomic level, stress, crime, drunkenness, living in a rural area, beginning to work at an early age, taboos on sexuality, and social isolation.

A study carried out identified that the individual risk factor represents 71.6%, the family factor 20.3%, and the social factor 11.6%. This is also influenced by the lack of information on the correct use of contraceptive methods and fertility, thus increasing the risk of pregnancy. A pregnant adolescent runs into emotional and social crisis, since she is still in the processes of somatic and psychological changes, resulting in unresolved conflicts.

In the first stage of adolescence (<14 years) the impact of pregnancy is greater, exacerbating the fear of labor pains, their thinking is focused on their personal needs but not on the fact that they will be mothers. They do not assume their upbringing in a responsible way (López, 2018).

In middle adolescence (14 to 16 years), as their gender identity has already been established, their pregnancy is expressed erotically, they show their pregnant abdomen. It is common to find mixed feelings and euphoria and depression stand out. In late adolescence (>18 years), the pregnancy is considered to consolidate the relationship, and raising a child usually does not have any difficulties.

In the United States, the first visit was estimated to be at 16 weeks for adolescent girls and at week 12 for older women; having a null follow-up in 2-3%. The problems that can occur in the prenatal controls according to the trimester in which it appears for the first trimester are the following:

1. Vomiting in 83.3% in patients who are under control and in 86% in uncontrolled patients.
2. In 16.9% Metrorrhagia in adolescents and 5.7% in adults.
3. In pregnant adolescents, there are about 28.2% spontaneous abortions.

For the second and third trimesters:

1. The nutritional deficit causes iron deficiency anemia, presenting 13.5% anemia in controlled patients and 68% in uncontrolled patients.
2. Urinary tract infections, even minimal, occur mostly in 14-year-old patients and can even reach 23.1%.
3. Due to the physical immaturity of adolescent women, preterm birth is threatened in 11.42%, more than in adults.
4. Gravid Arterial Hypertension occurs mostly in patients between 12 and 16 years old, influencing being primiparous. It also occurs in 18.2% of preeclampsia and 5% of eclampsias.
5. Intrauterine growth retardation is attributed to the biological immaturity of the mother, poor nutrition, or poisonings.
6. Fetal dystocia such as breech presentation occurs in 1.9% to 10% of adolescent girls.
7. Cephalo-pelvic disproportions are frequent in adolescent girls because they have not yet reached an adequate pelvic configuration or a size as in maturity.
8. There are more vaginal fetal extractions with instruments and not so much cesarean section.
9. The Sullivan test and the glycemic curve may be more positive in pregnant adolescents in 38.4%.

#### Preeclampsia

This is the presence of high levels of blood pressure  $\geq 140/90$  mmHg, either 2 measures with a difference of 4 hours in previously normotensive women or measures  $\geq 160/110$  mmHg in previously hypertensive women who are in treatment, added proteinuria  $> 300$  mg in 24 hours or a proteinuria/creatinuria value  $\geq 0.3$  (Pablo et al., 2020), (Guerra et al., 2021).

This is diagnosed after 20 weeks of gestation and up to 6 weeks postpartum, occurring in 7% of pregnancies and its only treatment is the termination of pregnancy. It mainly affects primiparous women and may occur in multiple pregnancies, chronic hypertension, diabetes, nephropathy, gestational trophoblastic disease (Sierra et al., 2018), (Carralero et al., 2020). Table 1 shows a classification of risk factors.

Table 1. Risk Factors.

1 High risk factor	2 or more moderate risk factors
Hypertensive disorders in a previous pregnancy (includes preeclampsia)	First pregnancy
Chronic kidney disease	BMI > 25
Autoimmune diseases such as lupus, systemic erythematosus, tronofilias, or antiphospholipid syndrome	Maternal age equal to or greater than 40 years
Type 1 and 2 diabetes mellitus	Teenage pregnancy
Chronic hypertension	Conditions leading to hypertension (large multiple pregnancy placentas)
	Birth interval greater than 10 years
	Preeclapsy family history
	Urinary tract infection
	Periodontal disease

### Preeclampsia pathophysiology

An important predisposing factor for the development of preeclampsia is an abnormal maternal response during the placentation period. Taking into account that an inadequate remodeling of the spiral arteries during the second trophoblastic invasion can generate a hypoxic environment that triggers a complex cascade of events that result in an inadequate endothelial function; since this modifies the permeability and vascular tone causing hypertension and proteinuria.

This pathology develops in stages, the first being an asymptomatic, silent stage, characterized by hypoperfusion and placental hypoxia, which can generate ischemic events in the villi, these, in turn, promote the production and release of certain factors in the maternal circulation that can trigger in a state of generalized inflammation. This, in turn, triggers the second stage of this disease that is characterized by restriction of plasma volume, vasoconstriction, and activation of the coagulation cascade, once it reaches this stage, it is when the patient is diagnosed, unfortunately too late (Norton et al., 2018), (Gómez et al., 2019).

This period is critical since there will be remodeling in the spiral arteries by the invading cytotrophoblast, which will produce a vasodilator effect, thus producing a change in the muscle tunic with the disappearance of muscle fibers and a reduction in adrenergic activity, in addition to increased production of prostacyclins and nitric oxide that will significantly increase blood flow, resulting in a placental circulation with low resistance and high blood flow.

The endothelium of the spiral arteries is normally replaced by one composed of maternal and fetal parts with all the functions of endothelial cells. Studies have shown that this endothelial conversion process is limited to syncytiotrophoblast cells that come from the fetal compartment and not those that come from the placental villi. In preeclampsia, endothelial cells do not undergo this normal physiological change, being formed mostly by endothelial cells of the fetus, which predisposes the vascular walls to not have adequate flexibility, this being one of the causes of increased blood pressure and all the systemic complications that it produces (Michelassi, 2019), (Bracamonte-Peniche et al., 2018).

### Diagnosis

Blood pressure is taken twice, the result of values greater than or equal to 140/90 mmHg with an interval of 4 hours within 7 days, beyond that, positive proteinuria must be present through a test strip (+) in the same way urine proteinuria values greater than or equal to 3gr in 1 day. Another way to diagnose it is by taking blood pressure and if it is greater than or equal to 160/110mmHg, positive proteinuria may be present through a dipstick (+) or a urine protein determination greater than or equal to 3gr in 24 hours. All this must be present or related to vasomotor symptoms such as scotomas, headache, tinnitus, dizziness, nausea, among others. (Alban et al., 2021).

### Clinic

As has been seen in recent years a new classification given by the ACOG, which is:

- Preeclampsia WITHOUT signs of severity: the pregnant woman will have blood pressure figures for TAS  $\geq 140$  and  $< 160$  mmHg and TAD  $\geq 90$  and  $< 110$  mmHg greater than  $> 20$  weeks. Proteinuria in positive test strip ++. Positive 24-hour proteinuria and absence of signs, symptoms, and laboratory tests that indicate severity.
- Preeclampsia WITH signs of severity: the pregnant woman will have figures of SAT  $\geq 160$  mmHg, TAD  $\geq 110$  mmHg in pregnancy  $> 20$  weeks. Dipstick proteinuria ++ / +++ or proteinuria greater than 3g in 24 hours.

Existence of one of the following signs, symptoms, and laboratory tests:

- Vasomotor: pain in the epigastrium and right upper quadrant, headache, tinnitus.
- Hemolysis
- Platelets  $< 100,000$  mm<sup>3</sup>.
- Hepatic dysfunction or alteration with increased transaminases. (TGO, TGP  $> 40$  IU/L, bilirubins  $> 1.1$  mg/dl with a predominance of indirect, lactic dehydrogenase (LDH:  $> 600$  U/L).
- Oliguria less than 500 ml in 24 hours.
- Acute Pulmonary Edema.
- Acute renal failure.

#### Treatment for pregnant women under 34 weeks:

Magnesium sulfate:

- Impregnation: 20 mL of 20% magnesium sulfate (4 grams) + 80 mL of isotonic solution, go to 300 ml/hour in an infusion pump or 100 drops/minute with infusion equipment in 20 minutes (4 grams in 20 minutes).
- Maintenance: 50 mL of 20% magnesium sulfate (10 grams) + 450 mL of isotonic solution, move to 50 mL/hour in an infusion pump or 17 drops/minute with infusion equipment (1 gram per hour).

Pulmonary Maturation: Glucocorticoids are used for fetal maturation between 24 and 34 weeks gestation.

- Betamethasone: 12mg intramuscularly at the gluteal level, every 24 hours only for two doses.
- Dexamethasone: 6mg intramuscularly in the buttock, every 12 hours, which would correspond to a total of 4 doses.

Laboratory exams:

- Hemogram with platelet count.
- Coagulation tests.
- Creatinine, urea, uric acid, bilirubin, liver transaminases (AST, ALT), LDH, and blood smear.

- Random proteinuria/creatinine ratio in urine, or 24-hour proteinuria and if these tests are not available, perform proteinuria strip
- Fetal well-being tests.

#### Treatment for pregnant women over 34

Preeclampsia without signs of severity, the guidelines indicate expectant management accompanied by the determination of pregnancy after 37 weeks. In addition, drugs should be administered to stabilize the mother-fetus pairing.

Magnesium sulfate:

- Impregnation: 20 mL of 20% magnesium sulfate (4 g) + 80 mL of isotonic solution, move to 300 ml/hour in an infusion pump or 100 drops/minute with infusion equipment in 20 minutes (4 g in 20 minutes).
- Maintenance: 50 mL of 20% magnesium sulfate (10 g) + 450 mL of isotonic solution, move to 50 mL/hour in an infusion pump or 17 drops/minute with infusion equipment (1 g/hour).

Nifedipine:

- Only when there is a tocolytic appearance, until completing 37 weeks of gestation.
- 10 mg orally every 20 or 30 minutes according to the response. Maximum dose: 60 mg and then 10 - 20 mg every 6 hours orally. Maximum dose 120 mg in 24 hours.

For those pregnant women who are  $\geq 37$  weeks 0 days, the termination of pregnancy is indicated or induced since that is the definitive treatment for preeclampsia. Vaginal delivery is recommended if there is no obstetric complication or contraindication that indicates the termination of the pregnancy via the upper route. Magnesium sulfate is administered to all pregnant women with preeclampsia during delivery, trans-cesarean section, and postpartum according to the previously established doses.

#### Prevention measures

There has not been any type of effective/safe treatment, however, it has been shown that the administration of calcium and acetylsalicylic acid (ASA) can help during pregnancy but it has been seen that the administration of calcium  $> 1$ g per day, has shown a significant decrease in the risk of developing preeclampsia and preterm birth by 52%.

The effective dose of ASA ranges between 75 and 100mg per day for the prevention of gestational hypertension or pre-eclampsia in high-risk pregnant women. Consideration should be given to suspending the administration of ASA

at week 35 since it can cause prolongation of pregnancy and post-maturity (Murillo-Zavala et al., 2021), (León et al., 2021).

### Complications

Some of the main complications are:

**Eclampsia:** this is a disorder or consequence of preeclampsia, although lately it has been seen that the patient may present eclampsia without previously having preeclampsia. But it is not usual and is commonly directly related to preeclampsia since it is more common, which is characterized for presenting all the signs and symptoms. And in some cases seizures. In most cases, there are no symptoms or warning signs with which to anticipate eclampsia. Since eclampsia may have serious consequences for the mother and the fetus, we must remember that eclampsia is a true emergency since both the mother and the fetus are at risk, so the delivery becomes necessary, regardless of the gestation time of the pregnancy.

**Fetal Growth Restriction:** when we have this type of disorder it is very common to find both size and low weight, in relation to gestational age this is because the placenta does not receive enough blood supply, therefore the fetus will not receive the adequate levels of blood and oxygen, therefore the fetus will receive fewer nutrients that may cause slow growth, which is why in these cases there is a low birth weight and/or premature delivery.

**Premature Delivery:** it is one of the most common complications of preeclampsia that occur during pregnancy, it is one of the solutions that can safeguard both the life of the mother and the fetus. It is commonly performed before 37 weeks, but we must consider all the complications that the neonate may present, such as the development of respiratory problems due to lung immaturity as well as the risk of metabolic diseases in the short and long term, etc.

**HELLP syndrome:** This syndrome is characterized by hemolysis, increased liver enzymes, and low platelet count, remembering that this is one of the most serious complications of preeclampsia. This is identified by showing the symptoms corresponding to preeclampsia, as well as liver and kidney disorders that could be fatal for the mother.

**Damage to various organs:** Since pre-eclampsia has multiple physiological alterations that occur during pregnancy, these may cause short and long-term damage to different organs such as kidneys, liver, lungs, heart, retina, etc. They can even trigger more serious problems such as hemorrhagic cerebrovascular events (Plaza et al., 2021), (Solaz-García et al., 2021).

Figure 1 shows a representation of the ranking of the main risk factors.

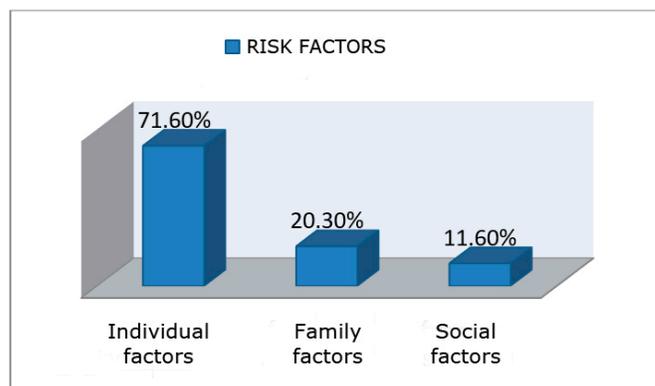


Figure 1: Representation of the classification of risk factors.

Table 2 shows a distribution of women under 18 years of age who developed preeclampsia. Table 3 presents the comparison of the most frequent complications between adolescents and pregnant adult women.

Table 2. Comparison of women under 18 years of age who developed preeclampsia

Nulliparous women with concomitant diseases	Healthy gilts
32.3%	7.5%

Table 3. Comparison of the most frequent complications among adolescents and pregnant adults

Complications	10-19 years	20-35 years	≥ 36 years
Hasty delivery	5	5	3
Placenta retention	1		2
Postpartum hemorrhage	2		
Perineal tears	50	37	20
Gestational hypertension	1		
Oligohydramnios	2		5
Fetal suffering	1		
Hellp syndrome	1	1	
Preeclampsia	4	1	3
Eclampsia	1	1	1
Anemia	14	2	4
Preterm delivery	2	1	2

It can be observed in a sample of 172 pregnant women, that extreme ages are causes of greater complications in pregnancies.

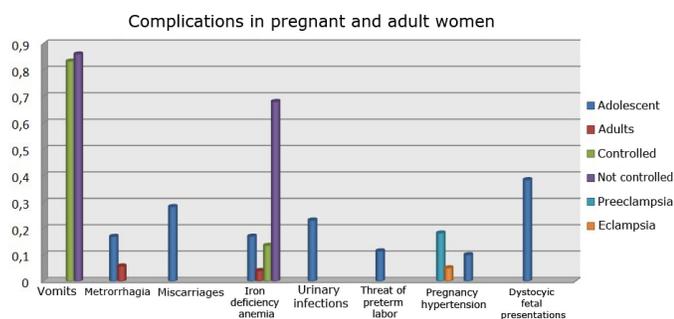


Figure 2: Classification of complications in pregnant women

As a result, we have that pregnancies in adolescent women have several complications, the most important of which is the lack of development at the time of conceiving. Not only with preeclampsia, they more frequently have gastrointestinal disorders, metrorrhagia, spontaneous abortions, urinary tract infection, threatened preterm labor, gestational hypertension, dystocia, and gestational diabetes. In addition to showing up late for their prenatal checkups. Adolescent pregnant women with preeclampsia are very prone to postpartum hemorrhage, knowing that it is the leading cause of maternal death in our country.

In this review, it was possible to show that adolescence is a risk factor for presenting hypertensive disorders during pregnancy, with a higher percentage of preeclampsia, with signs of severity. In addition to age, the complications shown are associated with social and economic factors. It is believed that all women under 20 years of age have a higher risk of developing preeclampsia. The factor of being primiparous is important, compared to primiparous women aged 20-25 years, who showed a lower incidence of preeclampsia. Similar findings were found in different parts of the world, when studies evaluating the relationship between preeclampsia and adolescence, including our country. Regarding preterm birth, it was evidenced that they occur mostly in children under 15 years of age.

Adolescence itself is not corroborated as a risk factor for maternal anemia, however, several studies found a higher percentage at this age, because adolescents are physically growing and their iron requirements lead to a negative balance and make the patient much more susceptible to anemia during pregnancy.

In addition, it was found that adolescents can be more sexually active during their pregnancy compared to older women, and a higher risk of urinary tract infections was also found. In adolescents, because their psychological development has not been completed, there is a greater tendency to suffer from depression during pregnancy and postpartum.

The age at which a woman becomes pregnant is also essential at the time of delivery as a determining factor for neonatal mortality in those under 15 years of age, while at an older age (26-35 years) it is a protective factor. Having a long-term influence on the risk of infant mortality, low educational performance, a greater tendency to abuse drugs and alcohol, and in the future being adolescent parents, the younger the age, the greater the risk.

## CONCLUSIONS

Pregnancy in the adolescent has multiple risks not only in the physiological field but also taking into account their lack of intellectual development, and their inability to carry the pregnancy adequately, further increasing their risk percentage.

In this research, it was evidenced that 90% of preeclampsia cases occur in pregnant adolescent girls. Therefore, the risk and the influencing factors are precipitously high, both in terms of mortality and morbidity of the mother and fetus. Either due to the lack of prenatal controls, since the diagnoses are late, or due to the immaturity and incompetence of the adolescent, which carries many dire consequences.

The adolescent pregnant woman is directly associated with preeclampsia, which increases its complications directly and often requires termination of the pregnancy, or as one of the immediate means, surgical intervention such as emergency cesarean sections is performed, due to the risk of the mother and the fetus as we have been pointing out. Since depending on the gestational age in which it is found, it will entail multiple risk factors for both the newborn and the mother or future pregnancies.

Most pregnant women with a diagnosis of preeclampsia have an incomplete primary education level (26%), residence in an area or rural zone is (61%), and less than 3 controls (63%), which is what shows that social, environmental, psychological and physiological factors are directly predisposing to the appearance of preeclampsia in adolescents. Either due to the lack of medical information regarding the care of both their physical, psychological and reproductive health as well as the severity and consequences of suffering from preeclampsia.

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