University Clinical Center of Vojvodina, Novi Sad
Clinic for Gynecology and Obstetrics[1]
University of Novi Sad, Faculty of Medicine Novi Sad,
Department for Gynecology and Obstetrics[2]
University Clinical Center of Vojvodina, Clinic for Neurosurgery, Novi Sad[3]
Rehabilitation Clinic "Wellness studio Laser", Vrbas[4]

Original study
Originalni naučni rad
UDK 618.4/.5-053.6:616-084
https://doi.org/10.2298/MPNS2402044R

CHILDBIRTH IN ADOLESCENTS – FEATURES AND OUTCOMES

POROĐAJI ADOLESCENTKINJA – KARAKTERISTIKE I ISHODI

Jovana RODIĆ[1], Aleksandra VEJNOVIĆ[1,2], Sara ĐURICA[1], Dušan RODIĆ[3], Dušica PEROVIĆ[4] and Ljiljana MLADENOVIĆ SEGEDI[1,2]

Summary

Introduction. Adolescent pregnancies significantly impact the welfare of young mothers, their infants, and the general population. These pregnancies represent a public healthcare concern associated with numerous consequences. **Aim**: To investigate the prevalence of adolescent pregnancies and their outcomes. **Material and Methods.** This retrospective descriptive study included adolescents who gave birth at the Gynecology and Obstetrics Clinic between January 1, 2020 and December 31, 2020. Data on anthropometric measurements, number and mode of deliveries, newborn birth weights, and complications were collected from medical records and statistically analyzed. **Results.** A total of 174 adolescents (aged 13-19) were included in the study. Most were first-time mothers living in common-law unions. Four spontaneous twin pregnancies were documented. No significant differences were found in the anthropometric measures between younger (<15 years old) and older (16-19 years old) adolescents. Pelvic measurements did not affect the mode of delivery. Younger adolescents and those with smaller pelvic measurements experienced longer hospitalizations. Vaginal delivery was the prominent mode of birth. Newborns delivered by caesarian section had significantly lower birth weights and lengths. While no significant complications during labor and delivery were observed, there was notable postpartum blood loss and higher rates of anemia in the puerperium. **Conclusion.** Although the number of adolescent pregnancies and births is declining, it still remains a significant concern. Well-developed perinatal care and the promotion of reproductive health within educational and health systems could not only further reduce pregnancy rates but also ensure optimal conditions for normal pregnancies and deliveries in adolescents.

Key words: Pregnancy in Adolescence; Adolescent; Pregnancy Outcome; Delivery, Obstetric; Cesarean Section; Infant, Newborn

Sažetak

Uvod. Trudnoće u adolescentnom periodu utiču na dobrobit mladih majki, njihovih beba i opšte populacije. One predstavljaju globalni javnozdravstveni problem povezan sa višestrukim posledicama. Cilj rada je da se izvrši uvid u prevalenciju trudnoća i ishode porođaja adolescentkinja, kao i njihove novorođenčadi. **Materijal i metode.** Retrospektivna, deskriptivna studija adolescentnih majki koje su porođene u periodu od 1. januara 2020. do 31. decembra 2020. godine na Klinici za ginekologiju i akušerstvo. Antropometrijski parametri, broj i način porođaja, težina novorođenčeta i podaci o komplikacijama povezanim sa trudnoćom i porođajem prikupljeni su iz medicinske dokumentacije i statistički analizirani. **Rezultati.** Ukupno je bilo 174 adolescentkinje (13−19 godina). Većina njih su bile prvorotke iz vanbračne zajednice. Verifikovane su četiri spontane blizanačke trudnoće. Nije bilo razlike u antropometrijskim merama mlađih (< 15 godina) i starijih (16−19) adolescentkinja. Karlične mere nisu uticale na način porođaja, ali je duži period hospitalizacije primećen kod mlađih adolescentkinja i onih sa manjim karličnim merama. Porođaj je uglavnom završen vaginalno. Utvrđeno je da su carskim rezom rođena deca sa značajno manjom telesnom masom i dužinom. Nisu verifikovane značajnije komplikacije, sporadično je uočen veći postpartalni gubitak krvi, kao i pacijentkinje sa anemijom u puerperijumu. **Zaključak.** Broj trudnoća i porođaja u adolescentnom uzrastu je u padu, ali i dalje predstavlja veliki problem i rizik. Adekvatno razvijena antenatalna i perinatalna zaštita i promocija reproduktivnog zdravlja u okviru obrazovnog i zdravstvenog sistema bi dovela do daljeg pada stope trudnoća, ali i obezbedila optimalne uslove za uredan tok trudnoće i porođaja adolescentkinja.

Ključne reči: adolescentska trudnoća; adolescenti; ishod trudnoće; prirodni porođaj; carski rez; novorođenče

ORCID NUMBER
Jovana Rodić - 0009-0006-0669-771X
Aleksandra Vejnović - 0000-0001-7697-3261
Sara Đurica - 0009-0003-6514-948X
Dušan Rodić – 0009-0007-2911-6217
Dušica Perović – 0000-0002-8206-351X
Ljiljana Mladenović Segedi – 0000-0001-7867-1208

Corresponding Author: Dr Jovana Rodić, UKCV - Klinika za ginekologiju i akušerstvo,
21000 Novi Sad, Branimira Ćosića 37, E-mail: 965jovana@gmail.com, aleksandra.vejnovic@mf.uns.ac.rs

Abbreviations

OBGYN – Clinic for Gynecology and Obstetrics
UCCV – University Clinical Center of Vojvodina
MIN – the lowest/minimum value
MAX – the greatest/maximum value
VS. – Versus
MODE – modal value
USA – United States of America

Introduction

In recent decades, adolescent pregnancy has emerged as a significant healthcare issue in both developed and developing countries. However, it is not a new phenomenon. According to the World Health Organization, adolescent pregnancy refers to pregnancies in women aged 10 to 19 years, with those aged 10-15 often considered as a distinct group [1, 2]. Adolescence is a transitional period during which a carefree child becomes a responsible, reproductive individual [3]. This phase is marked by rapid physical, psychological, socio-cultural, and cognitive changes that adolescents must navigate in a short time while establishing their identity and autonomy [4]. The onset of adolescence begins with puberty, signified by the first menstruation (menarche) in females [5]. Recent decades have seen a trend towards earlier menarche, initiating the reproductive period earlier, the long-term consequences of which are still unclear.

In Serbia, 29% of adolescents aged 15-19 years have had sexual experiences. Young people often lack a well-developed awareness of the importance of safe and responsible sexual behavior, placing them at higher risk for negative outcomes from sexual activity. Early sexual encounters are risky, leading to unintended pregnancies and associated consequences: physical risks from abortion, as well as familial, economic, psychological, and social impacts. Additionally, there is an increased risk of sexually transmitted diseases and a tendency towards later promiscuity, which can hinder the formation of stable relationships and marriages. The likelihood of complications is higher in young adolescent women – preterm delivery, miscarriage, stillbirth, and maternal mortality are four times more likely compared to women over 20 years old [1]. Newborns of adolescent mothers more frequently have low birth weights due to prematurity and intrauterine growth retardation [6]. Adolescence, being a critical period for psychological development and identity formation, can lead to adolescent mothers experiencing a "syndrome of lost adolescence" – difficulty in forming a stable identity and achieving independence. Long-term consequences of adolescent pregnancy also include certain destructive behaviors such as smoking, drug use, alcoholism, and frequent changes in sexual partners [1, 7].

Material and Methods

The data for this study were retrieved from the archives of the Clinic for Gynecology and Obstetrics at the University Clinical Center of Vojvodina (OBGYN UCCV). The study encompassed all patients aged 10-19 years who delivered at the Clinic between January 1 and December 31, 2020. Medical records included information such as the patients' age, residence, occupation, body weight, height, external conjugate diameter measurement, number of pregnancies, parity, gestational age, mode of delivery, blood loss, length of hospital stay, and any pregnancy-related complications. Data on newborn birth weights and Apgar scores at the first and fifth minute were also collected.

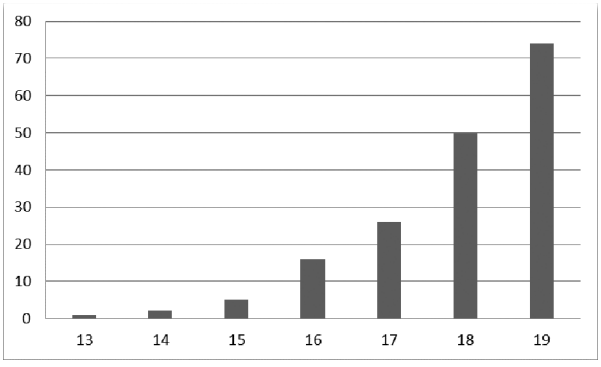
All collected data were analyzed using the IBM Statistical Package for the Social Sciences statistical software. Numerical variables were presented as mean, mode, and median values, along with measures of variability such as standard deviation. Categorical variables were presented as frequencies and percentages. The Student t-test was used to compare numerical variables between groups, while differences in categorical variables were assessed using the Chi square test (χ^2). Statistical significance was set at $p<0.05$.

Results

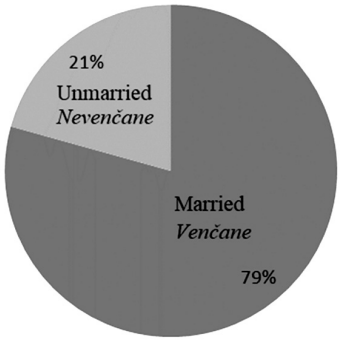
Out of a total of 6622 deliveries at the Clinic for Gynecology and Obstetrics of the University Clinical Center of Vojvodina in 2020, 174 were among adolescents (2.63%). **Graph 1** illustrates the distribution of patients by age. The average age of adolescents giving birth in 2020 was 17.93 ± 1.24 years (MIN 13, MAX 19). The youngest mother was 13 old, and the largest group (74/174) consisted of 19–year-olds. Adolescents aged 15 or younger constituted 4.59% (8/174) of the sample, while those aged 16-19 years made up 95.4% (166/174). Among all adolescent patients at OBGYN UCCV in 2020, 36/174 (20.69%) were married, and 138/174 (79.31%) were unmarried **(Graph 2).**

Based on collected body weight and height data, adolescents had an average body weight of 71.51 ± 14.74 kg (MIN 44, MAX 120) and an average height of 160.79 ± 10.73 cm (MIN 65, MAX 180). The average body mass index among adolescents who gave birth was 28.09 ± 10.26 kg/m^2 (MIN 16.36, MAX 142.01).

The average external pelvic measurements (conjugata externa) were 16.25 ± 1.16 cm (MIN 13,



Graph 1. Distribution of patients by age
Grafikon 1. *Starosna distribucija pacijentkinja*

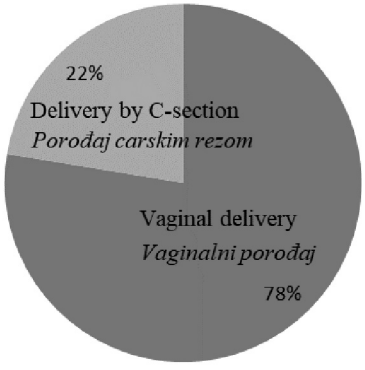


Graph 2. Marital status of patients
Grafikon 2. *Bračni status pacijentkinja*

MAX 20). There were no statistically significant differences in pelvic measurements between adolescents aged 15 or younger and those aged 16-19 years (p=0.14). Similarly, no significant differences were found in birth weight (p=0.3), birth length (p=0.28), blood loss (p=0.11), or length of hospital stay (p=0.35) between adolescents with conjugata externa ≤15 cm and >15 cm.

However, adolescents with conjugata externa of 15 cm or less had a statistically significantly longer hospital stay post-delivery (p=0.04). There were no statistically significant differences in the mode of delivery between these two groups (p=0.75). On average, adolescents stayed in the hospital for 5.94 ± 3.36 days (MIN 2, MAX 24, MODE 3), and the average time from delivery to discharge was 4.73± 2.47 days (MIN 2, MAX 20, MODE 3).

Among adolescents who gave birth at the OBGYN UCCV in the 2020, 135 out of 174 (77.59%) delivered vaginally, and 39 out of 174 (22.41%) via caesarean section **(Graph 3)**. The hospital stay of adolescents who delivered via caesarean section was significantly longer compared to those who delivered vaginally (p=0.00000099). Hospitalization duration was statistically significantly longer for patients aged 15 years or younger compared to those aged 16-19 years (p=0.04). The time from delivery to discharge was also significantly longer for patients aged 15 years or younger (p=0.008). The values of external conjugate in adolescents did not show a statistically significant impact on the mode of delivery (p=0.27%). There were no statistically significant associations between the patients' age and mode of delivery (p=0.45), nor between the length of pregnancy and the mode of delivery (p=0.06).



Graph 3. Mode of delivery in adolescents
Grafikon 3. *Način porođaja adolescentkinja*

Newborns of adolescents who delivered via caesarean section had significantly lower birth weights (2993±613 g vs. 3212±500 g, p=0.01) and shorter body length (47±2.5 cm vs. 49 ±2.2 cm, p=0.001) than those delivered vaginally.

An analysis of the mode of delivery concerning the adolescents' educational level (elementary school/high school and college), place of residence (village/town), and marital status (unmarried/married) revealed no statistically significant differences (p=0.91, p=0.19, p=0.67 respectively).

Episiotomy was performed on 91 out of 135 (67.41%) patients, while it was not needed in the remaining 44 out of 135 (32.59%). On average, the adolescents experienced a blood loss of 451.69 ± 129.64 ml (MIN 300, MAX 1450). Two patients experienced a more significant blood loss of 1450 ml and 1300 ml, respectively. Both patients were 19 years old. One patient, aged 15, lost 860 ml of blood. Although the average blood loss during delivery for adolescents aged 15 or younger (532±190 ml) was higher than that for adolescents aged 16-19 (488±127 ml), the difference was not statistically significant (p=0.07). No significant differences in blood loss were found between the two groups of adolescents with regard to the external conjugate measure (≤15 cm vs. >15 cm) (p=0.11).

The average number of pregnancies in adolescents was 1.32 ± 0.6 (MIN 1, MAX 4), and the average parity was 1.21 ± 0.48 (MIN 1, MAX 4). The average gestational age at delivery did not differ significantly with respect to the adolescents' age (≤15 years 38.85±2.8 vs. 38.93±1.88, p=0.45). A total of 178 babies were born from 174 pregnancies, with four being twin pregnancies (2.3%). Of the newborns, 99 (55.62%) were male and 79 (44.38%) were female. The average birth weight of newborns was 3186.06 ± 509.24 grams (MIN 1160, MAX 4450), and the average birth length was 48.91 ± 2.27 cm (MIN 37, MAX 54). The parameters of birth weight and length for newborns born to mothers aged 13-15 were compared to mothers aged 16-19 years. No statistically significant differences were found in birth weight and length between these two groups of adolescents (p=00.19 and p=0.12 respectively).

Discussion

The number of adolescent deliveries is showing a slight downward trend both in our country and globally. We analyzed a period of twenty five years, drawing on studies conducted at the Clinic for Gynecology and Obstetrics of the University Clinical Center of Vojvodina. The frequency of adolescent births decreased from 7.54% in 1992 to 2.63% in 2020, with intermediate drops to 6.61% in 1996, 5.66% in 1999, 4.51% in 2002,2.22% in 2008, and 2.07% in 2012 [1, 8]. In the United States, the fre-

quency rate of adolescent births fell from 6.18% in 1991 to 3.13% in 2011 [9]. Similarly, in Great Britain, the rate of adolescent pregnancies was reduced almost by almost half from 1999 to 3.83% in 2009 [10].

Caesarean sections are becoming increasingly common worldwide, often without clear indications. At the OBGYN UCCV, the frequency of caesarean sections in the general patient population tippled from 9.7% in 1992 [1] to 21.87% in 2003 [8], 31.84% in 2012, reaching 33.69% in 2020. A similar trend is observed globally, with the USA where the frequency rate of delivery by caesarean section was 20.7% in 1996, only to record a constant rise over the next 15 years and to reach 32.8% in 2011 [9]. At our clinic, adolescents have significantly less C-sections than adult patients. It is presumed that young patients will have more pregnancies and births in their future life, which could influence the obstetrician's decision to avoid scarring the uterus. Despite adolescent pregnancies and births being considered high risk, the percentage of adolescent C-sections at our clinic was 22.41% in 2020. Data obtained in previous studies revealed that the percentage of adolescent deliveries by caesarean section at the OBGYN UCCV was 3.27% in 1992 [1], leading to a conclusion that the C-section rate in adolescents increased 7 times by 2020, an increase that is approximately twice the increase observed in the general patient population over the period of 30 years.

The rate of caesarean sections exceeds the World Health Organization's recommendation rate of 15% [11]. The frequent use of C-sections among adolescents might be attributed to pelvic immaturity, leading to cephalopelvic disproportion, particularly in those under 15 years of age. However, our study found no significant difference in pelvic development (measured by external conjugate) between adolescents aged 15 or younger and those aged 16-19. This suggests that the number of years since menarche may be a more critical factor for pelvic development than chronological age. Interestingly, adolescents aged 15 years or younger had a C-section rate of 37.5%, compared to 21.69% for older adolescents, and that newborns had lower birth weights and lengths. This raises the question of whether C-sections are justifiably more common in younger adolescents.

In the 2020, 77.59% of adolescent deliveries at the OBGYN UCCV were vaginal. This can be attributed to the better functioning of the young myometrium, a less competent cervix, and greater connective tissue elasticity in young women. The percentage of episiotomies among adolescents has fluctuated over the years, with a high of 68.84% in 1992, dropping to 55.35% in 2002 [1], and 45.86% in 2012, and rising again to 67.41% in 2020. This high percentage can be explained by the fact that most adolescents were first time mothers.

Our study found no statistically significant impact of place of residence, educational level, or marital status on the delivery outcomes of adolescents.

However, the physical immaturity and frequent anemia in adolescent pregnancies and puerperium make blood loss during delivery a significant factor. While the common blood loss in vaginal delivery is approximately 500 ml and up to 1000 ml in C-section [12], our study found a higher average blood loss in younger adolescents, though the difference was not statistically significant.

Studies often describe babies born to adolescent mothers as having low birth weights due to prematurity and intrauterine growth retardation [13, 14], placing them at high risk of perinatal morbidity and mortality. Our study found no statistically significant relationship between the adolescents' age and their newborns' birth weight and length, likely due to small sample size and the good prenatal care provided.

However, our study did find that newborns of adolescents who delivered by C-section had significantly lower birth weights and lengths compared to those delivered vaginally.

The length of hospitalization and the time from delivery to discharge are critical factors in the recovery of adolescents, both physically and psychologically. Our study showed that these durations were significantly longer for those who delivered by C-section, where younger than 15 years, or had external pelvic measurements are 15 cm or less. Prolonged hospital stays are often due to delivery complications and to the need for extended medical care for the mother or child.

Adolescent behaviors have changed over the years, with younger initiation of sexual activity and varying contraceptive use. The decrease in adolescent births may result from increased contraception use or more abortions. Earlier studies at the OBGYN UCCV indicate that contraceptive use has not significantly increased, adolescents are more likely to opt not to give birth [1], impacting their later psychosocial circumstances.

Providing adequate healthcare, timely information, and social and economic support can reduce unintended pregnancies in adolescence, preventing significant late consequences.

Conclusion

The frequency of adolescent births has decreased threefold over the last 25 years. Although the rate of caesarean sections among adolescents has increased, it remains significantly lower than in the general population. Pelvic size is likely associated not only with age but also with the time since puberty and other factors not included in this study. Newborns of adolescents who delivered by C-section have lower birth weights and lengths. Adolescents who gave birth by C-section, those younger than 15 years, and those with external pelvic measurements of 15 cm or less require longer hospital stays. While adolescent pregnancies and births are declining, they still pose significant risks. Therefore, enhancing prenatal and perinatal care, promoting the social and economic status of the population, and improving adolescent reproductive health education and healthcare can further reduce the rate of teen pregnancies and ensure healthy pregnancy and delivery outcomes for adolescents.

References

1. Radeka G, Kapamadžija A, Bjelica A, Ćetković N, Stajić D. Tok i ishod porođaja u adolescentnom uzrastu - komparativna analiza za 1992. i 2002. godinu. Med Pregl. 2005;58(1-2):47-51.

2. WHO. Adolescent pregnancy. Issues in adolescent health and development. Geneva: WHO; 2004.

3. Agirović R, Plećaš D, Stanimirović B, Stanković A, Vasiljević M. Ginekologija i akušerstvo. Beograd: Medicinski fakultet; 2014.

4. National Institute of Mental Health. Child and adolescent mental health [Internet]. [cited 2024 Jun 1]. Available from: https://www.nimh.nih.gov/health/topics/child-and-adolescent-mental-health

5. Đurđević S, editor. Ginekologija. 3rd ed. Novi Sad: Medicinski fakultet Novi Sad; 2019.

6. Jolly MC, Sebire N, Harris J, Robinson S, Regan L. Obstetric risks of pregnancy in women less than 18 years old. Obstet Gynecol. 2000;96(6):962-6.

7. Ogawa K, Matsushima S, Urayama KY, Kikuchi N, Nakamura N, Tanigaki S, et al. Association between adolescent pregnancy and adverse birth outcomes, a multicenter cross sectional Japanese study. Sci Rep. 2019;9(1):2365.

8. Harville EW, Madkour AS, Xie Y. Predictors of birth weight and gestational age among adolescents. Am J Epidemiol. 2012;176(Suppl 7):S150-63.

9. Hoyert DL, Mathews TJ, Menacker F, Strobino DM, Guyer B. Annual summary of vital statistics: 2004. Pediatrics. 2006;117 (1):168-83.

10. Burrell C, Kropiwnicka Z. 0119 Teenage pregnancy – a decade since the UK department of health teenage pregnancy strategy plan: a review in a University teaching hospital in London, UK. International Journal of Gynecology & Obstetrics. 2012;119(Suppl 3):s302.

11. Wang CP, Tan WC, Kanagalingam D, Tan HK. Why we do caesars: a comparison of the trends in caesarean section delivery over a decade. Ann Acad Med Singap. 2013;42(8):408-12.

12. Novakov-Mikić A, Vejnović T, editors. Akušerstvo. 2nd ed. Novi Sad: Medicinski fakultet Novi Sad; 2020.

13. Mathews TJ, Miniño AM, Osterman MJ, Strobino DM, Guyer B. Annual summary of vital statistics: 2008. Pediatrics. 2011;127(1):146-57.

14. Smith PM, Sweet D, Holley R. United Kingdom Health Statistics 2010 [Internet]. 2010 [cited 2024 Apr 5]. Available from: URL https://www.ons.gov.uk/ons/rel/ukhs/united-kingdom-health-statistics/2010/index.html

Rad je primljen 16. V 2024.
Recenziran 7. VI 2024.
Prihvaćen za štampu 7. VI 2024.
BIBLID.0025-8105:(2024):LXXVII:1-2:44-48.