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Evaluation of the effect of maternal adolescent age on neonatal outcomes

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ABSTRACT

Objective: Adolescence is a phase that takes place 10-19 years of life, in which many changes in the physiological, anatomical, structural and psychological aspects and finally switch to adulthood. Adolescent pregnancies are associated with adverse obstetric and neonatal outcomes. In this study, we aimed to determine the the effect of adolescent age on maternal and neonatal outcomes.

Method: In this single-centre retrospective study, maternal and neonatal data were collected from medical records at Malatya Turgut Ozal University Hospital between August 2020 to August 2021.

Results: 326 patients met full inclusion criteria (137 adolescent pregnants and 189 control group). The adolescent mothers had lower educational status and were less likely to get adequate antenatal care (p<0.001 and p=0.012). The frequency of extra-marital and religious marriage was higher in adolescents (p<0.001). Although the mean gestational week and prematurity rates of newborns born to adolescent mothers were similar; the frequency of low birth weight and SGA newborns was significantly higher than control group (p=0.006 and p<0.001, respectively). The delivery room resuscitation requirement was higher in the adolescent group (p<0.001). Considering the hospitalization rates of newborns, it was statistically higher in the adolescent group (p=0.001). Among the main reasons for hospitalization, there was a statistical difference in terms of hypoglycemia in newborns born to adolescent mothers (p<0.001).

Conclusions: Adolescent pregnancies should be considered as high-risk pregnancies because of poor maternal and neonatal outcomes. Appropriate antenatal and neonatal care should be provided to adolescents with regular follow-ups during pregnancy.

Keywords: Adolescent, Adverse outcomes, Newborn, Pregnancy

Adölesan Anne Yaşının Neonatal Sonuçlara Etkisinin Değerlendirilmesi

Süreç

Geliş: 07/06/2022
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ÖZ

Amaç: Adolesan dönem, yaşamın 10-19 yıllarını kapsayan, fizyolojik, anatomik, yapısal ve psikolojik açıdan pek çok değişikliğin yaşandığı ve sonunda yetişkinliğe geçiş yapılan bir evredir. Adolesan dönemdeki gebelikler, olumsuz obstetrik ve neonatal sonuçlarla ilişkilidir. Bu çalışmada adolesan yaşının maternal ve neonatal sonuçlara etkisini belirlemeyi amaçladık.

Yöntem: Bu tek merkezli retrospektif çalışmada, Malatya Turgut Özal Üniversitesi Tıp Fakültesi Hastanesi'nde Ağustos 2020 ile Ağustos 2021 tarihleri arasında doğum yapan adolesan gebelerin ve bebeklerinin verileri tıbbi kayıtlardan toplanmıştır.

Bulgular: 326 hasta tam dahil edilme kriterlerini karşıladı (137 adolesan gebe ve 189 kontrol grubu). Adolesan annelerin eğitim durumu daha düşüktü ve yeterli doğum öncesi bakım alma olasılıkları daha düşüktü (p<0,001 ve p=0,012). Adolesanlarda evlilik dışı ve dini evlilik sıklığı daha yüksekti (p<0,001). Adölesan annelerden doğan bebeklerin ortalama gebelik haftası ve prematürite oranları benzer olmakla birlikte; düşük doğum ağırlıklı ve SGA yenidoğan sıklığı kontrol grubuna göre anlamlı derecede yüksekti (sırasıyla p=0,006 ve p<0,001). Doğumhanede resüsitasyon gereksinimi adölesan grupta daha yüksekti (p<0,001). Yenidoğanların hastaneye yatış oranlarına bakıldığında adolesan grupta istatistiksel olarak daha yüksekti (p=0,001). Hastaneye yatış nedenleri arasında adolesan annelerden doğan yenidoğanlarda hipoglisemi açısından istatistiksel farklılık vardı (p<0,001). Yenidoğanların hastaneye yatış oranlarına bakıldığında adolesan grupta istatistiksel olarak daha yüksekti (p=0,001). Hastaneye yatış nedenleri arasında adolesan annelerden doğan yenidoğanlarda hipoglisemi açısından istatistiksel farklılık vardı (p<0,001).

Sonuç: Adölesan gebelikler, maternal ve neonatal sonuçların kötü olması nedeniyle yüksek riskli gebelikler olarak değerlendirilmelidir. Adolesan gebelere, düzenli gebelik takipleri ile uygun antenatal ve neonatal bakım sağlanmalıdır.

Anahtar sözcükler: Adölesan, olumsuz sonuçlar, yenidoğan, gebelik

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Introduction

Adolescence is a phase that takes place between 10-19 years of life, in which there are many changes in the physiological, anatomical, structural and psychological aspects and finally switch to adulthood[1]. Adolescents are also divided into early (10-14 years), mid (15-17 years) and late adolescents (>17 years) within the psychosocial development process. Adolescent aged pregnancies are a global public health problem; according to World Health Organization (WHO) 2020 statistics, the worldwide adolescent pregnancy rate was 4.1% in last decade and majority of these are reported to be in low and middle-income countries and more likely poor, less educated and rural populations.[2,3] In general, most of the pregnancies in adolescence are extra-marital and unintened pregnancies, however there may be desired pregnancies obtained as a result of marriages made within relatives with/without civil marriage according to social characteristics.[4]

Adolescent age group is associated with adverse pregnancy outcomes such as gestational hypertension, cephalopelvic disproportion, preterm delivery and anemia.[5] In addition, previous studies reported that adolescent pregnancies also have negative effects on neonatal outcomes like low birth weight, low Apgar scores and small for gestational age (SGA).[6,7] Further, it has been associated with both incresed maternal and neonatal death.[1] In this study we aimed to determine the effect of adolescent age on maternal and neonatal outcomes.

Methods

This retrospective study was conducted in 326 maternal-newborn dyads who admitted for delivery in the Turgut Ozal University Hospital in August 2020 and August 2021. The data of all patients were reviewed from hospital electronical clinical database and clinical medical records. Adolescent-primiparous pregnants admitted to our hospital for delivery were included to the present study. As the control group, 20-25 years aged primiparous pregnant women who gave birth just after were included. Patients with chronic disease, multiple pregnancy, incomplete data and who gave stillbirth were excluded. Pregnants were evaluated for basic sociodemographic data, such as age, marital status, education level, consanguineous history, active smoking and obstetric data, including parity, regular antenatal follow-up (≥4 visits), delivery mode and pregnancy-related complications (premature ruptures of membranes-PROM, meconium-stained amniotic fluid-MSAF, preeclampsia, eclampsia, abruptio placenta, oligohydramnios, gestational hypertension and diabetes and acute fetal distress). Newborns were evaluated for baseline clinical characteristics, such as gestational age (GA), birth weight, low birth weight (<2500 gr), preterm birth (GA less than 37 weeks), being SGA (birth weight<10 percentile for GA) and large for gestational age (LGA, birth weight>90percentil for GA) status, APGAR scores at 1st and 5th minutes, major birth trauma (intracranial hemorrhage, clavicular and other bone fractures, brachial plexus injury and facial nerve palsy), delivery room resuscitation, asphyxia, neonatal intensive care unıt (NICU) admission and main reason and outcome (discharge/exitus).

This study was approved by the institutional review board (2021/97), and informed consent was obtained from parents, if necessary legal representatives of adolescents.

Statistical analysis

Data were given as median (min-max), mean (standard deviation), and number (percent). Compliance with the normal distribution was addressed with the Kolmogorov-Smirnov test. Mann-Whitney U test, independent samples t-test, Pearson chi-square test, Yatesin corrected chi-square test, and Fisher exact chi-square test was used in statistical analyses where appropriate. A p-value of <0.05 was considered statistically significant. IBM SPSS Statistics 26.0 program was used in the analysis.

Results

During the study period, 6676 women gave birth in our institution and 189 of these births were performed by adolescent pregnant women; the annual adolescent birth rate in our institution was 2.8%. Among all adolescent pregnants, 4 of them were excluded due to multiparity and 48 were excluded due to incomplete data. Among the 137 pregnant women included in the study, 2 were in the early adolescent, 99 were in mid-adolescent and the rest were in the late adolescent age group. The mean age of adolescent mothers and the control group was 16.86±0.08 and 22.31±0.31, respectively (p<0.05). The frequencies of extra-marital status and religious marriage were higher in the adolescent group than in the control group (p<0.001). The consanguineous marriage rates in the adolescent and control groups were 27% and 4.2%, respectively (p<0.001). The educational status of adolescent aged group was statistically lower than the control group (p<0.001). The adolescent-aged group also had a significantly lower rate of receiving regular antenatal follow-up (p=0.012). In obstetric outcomes, vaginal delivery and oligohydramnios frequencies were significantly higher in the adolescent group than in the control group (p<0.001 and p=0.042, respectively). On the other hand, active smoking, the presence of PROM, MSAF, preeclampsia and eclampsia, gestational diabetes and hypertension, acute fetal distress, and development of placental abruption were similar between groups. Maternal socio-demographic and obstetric characteristics are summarized in Table 1.

The mean gestational week of newborns born to adolescent mothers and the control group was 38±2.7 and 37.8±3.2 weeks, respectively, and the frequency of prematurity was similar between groups. However, the mean birth weight was significantly lower in the adolescent group (p=0.004). In addition, the rates of low birth weight and SGA in the newborn group born to adolescent mothers were significantly higher than in the control group (p=0.006 and p<0.001, respectively).

There was no difference between the groups regarding the presence of congenital anomaly and birth trauma (p>0.05) and there was no instrumental delivery in the study population. The delivery room resuscitation requirement was higher in the adolescent group compared to the control group (p<0.001). Given the hospitalization rates of newborns, it was statistically higher in the adolescent group (p=0.001). Among the main reasons for hospitalization, there was a statistical difference only in terms of hypoglycemia (p<0.001). Neonatal demographic and clinical characteristics are summarized in Table 2. No maternal or early neonatal death was observed during the study period.

Table 1. Comparison of socio-demographic and obstetric characteristics between adolescent pregnants and control group

	Adolescent Group (n=137)	Control Group (n=189)	p-value
Marital status, n (%)			
Extra marital	4 (2.9)	1 (0.5)	**<0.001**
Religious marriage	38 (27.7)	8 (4.2)	
Civil marriage	95 (69.3)	180 (95.2)	
Educational status, n (%)			**<0.001**
Elementary	90 (65.7)	19 (10.1)	
High School	37 (34.3)	148 (78.3)	
Collage	-	22 (11.6)	
Smoking, n (%)	5 (3.6)	12 (6.3)	0.41
Consanguinity, n (%)	37 (27)	8 (4.2)	**<0.001**
Regular antenatal follow-up, n (%)	104 (75.9)	165 (87.3)	**0.012**
Delivery mode			
Vaginal, n(%)	107 (78.1)	95 (50.3)	**<0.001**
Cesarean section, n(%)	30 (21.9)	94 (49.7)	
PROM, n (%)	7 (5.1)	13 (6.9)	0.67
MSAF, n (%)	19 (13.9)	20 (10.6)	0.47
Preeclampsia, n (%)	9 (6.6)	10 (5.3)	0.81
Eclampsia, n (%)	2 (1.5)	1 (0.5)	0.57
Abruptio placenta, n (%)	2 (1.5)	2 (1.1)	1.00
Oligohydroamnios, n (%)	10 (7.4)	4 (2.1)	**0.042**
Gestational diabetes, n (%)	6 (4.4)	17 (9)	0.17
Gestational hypertension, n (%)	11 (8)	7 (3.7)	0.15
Fetal distress, n (%)	14 (10.2)	11 (5.8)	0.21

Abbreviations: PROM; premature rupture of membranes, MSAF; Meconium stained amniotic fluid

Table 2. Comparison of the neonatal outcomes born to adolescent pregnants and control group

	Adolescent Group (n=137)	Control Group (n=189)	p-value
Gestational week, Mean±SD	38±2.7	37.8±3.2	0.65
Birth weight, gr, Mean±SD	2943.97±51.30	3094.51±53.22	**0.004**
Prematurity, n(%)	29 (21.2)	34 (18)	0.47
Low birth weight, n(%)	28 (20.4)	26 (13.8)	**0.006**
Birth trauma, n(%)	4 (2.9)	1 (0.5)	0.17
SGA, n(%)	21 (15.3)	7 (3.7)	**<0.001**
Delivery room resuscitation, n(%)	24 (17.5)	5 (2.6)	**<0.001**
APGAR 1st min, median (min-max)	8 (5-9)	8 (3-9)	0.69
APGAR 5th min, median (min-max)	9 (5-10)	9 (7-10)	0.07
Congenital anomaly, n (%)	4 (2.9)	2 (1)	0.24
NICU admission, n (%)	43 (31.4)	29 (15.3)	**0.001**
Respiratory distress, n (%)	11 (8)	16 (8.5)	1
Hypoglisemia, n (%)	17 (12.4)	1 (0.5)	**<0.001**
Hyperbilirubinemia, n (%)	12 (8.8)	10 (5.3)	0.31
Sepsis, n (%)	8 (5.8)	6 (3.2)	0.37
Asphyxia, n (%)	7 (5.1)	3 (1.6)	0.1

Abbreviations: SGA; small for gestational age, NICU; neonatal intensive care unit

Discussion

In this single-center retrospective study, we evaluated the demographic and clinical characteristics of newborns born to adolescent mothers and compared maternal and neonatal data with control group. The results of this study have revealed that babies born to adolescent mothers are at higher risk of having low birth weight, SGA status, hypoglycemia, needing delivery room resuscitation and NICU admission.

The findings obtained in this study, showed that adolescent mothers had lower educational status and also had lower civil marriage rates than the control group in the reproductive age. Besides, the consanguineous marriage rate was significantly higher in the adolescent group. Consistent with our findings in this study, in a study investigating maternal and neonatal characteristics among adolescent singleton pregnancies, most of the adolescent mothers were primary school graduates and the total civil and religious marriage rate was almost the same.[8] Likewise, Cebeci et al., in their study comparing the neonatal prognosis of adolescent and non-adolescent pregnancies, found the education level of the adolescent group to be lower.[9] All these similar results support the role of socio-cultural factors in the origin of adolescent pregnancies.

The data in the presented study identified that adolescent mothers were less likely to be regularly on clinical follow-up during the antenatal period. Again, in a previous study it was stated that 70% of adolescent pregnant women did not have regular antenatal follow-up.[10] Likewise, Kassa et al found that the number of antenatal care visits was lower than the adult group and also showed that it started in a later period of pregnancy.[11] Moreover, Gonzales-Andrade et al. showed that neonatal morbidities such as sepsis and respiratory distress were higher in the adolescent subgroup with insufficient prenatal controls.[12] To reduce pregnancy-related morbidities, regular antenatal care is recommended for all pregnant women; the inability to receive this care may be due to the lack of education status and related health awareness in adolescent pregnants. Although not statistically significant, when obstetric outcomes were evaluated, we found that preeclampsia, eclampsia, abruptio placenta, and gestational hypertension were more common in the adolescent group. Consistent with our results, in a previous study evaluating maternal, perinatal and neonatal outcomes of adolescent pregnancy, they reported that preeclampsia and gestational hypertension rates were not significantly different among groups.[13] In the present study, although the frequency of gestational diabetes was not statistically different among groups, Dowle et al. found that it was statistically lower in adolescent pregnants than the adult group.[14] In contrast to our results, in a WHO multicountry study, preeclampsia and eclampsia were significantly higher among adolescents.[1] This variation between reports may be due to differences in antenatal care and the number of participants included

in the studies. We also found that oligohydramnios frequency was significantly higher in the adolescent group, and we think that this difference may be related to intrauterine growth retardation and SGA. Also, Thirukumar et al. revealed a consistent result in their study.[15]

The findings of this study are consistent with previous studies describing that adolescents were more likely to be primiparous and delivered vaginally.[16,17] This result can be easily predicted due to the increase in parity and rate of repeated cesarean sections with age. However, Tsikouras et al. suggested that the frequency of cesarean section may be higher due to the immature structure of the adolescent pelvis and related cephalopelvic disproportion.[18] In this study, we did not find the frequency of birth trauma different between the groups. We may speculate that this result could be explained by lower birth weights in the adolescent group. Additionally, according to our results we did not find any difference between the groups in terms of having congenital anomalies. Likewise, in a previous study Barut et al. did not show any difference. However, in another study evaluating adolescent, reproductive and advanced age pregnant women, the fetal anomaly was found only in the adolescent group, and it was statistically significant.[19,20]

In the current study, we did not find a significant difference in prematurity rates between the groups. However, in a meta-analysis comparing neonatal outcomes between adolescent and adult mothers in developed countries, the findings showed that premature birth increased in the adolescent group and this increase was especially significant in the subgroup under 17 years of age.[3] Similarly, in a multicenter study from Africa, prematurity rates were statistically higher in adolescents.[11] These differences may be due to the heterogeneity between study settings and the number of participants. Our study also showed that babies born to adolescent pregnancies had lower birth weight, although we could not find a difference between gestational week and premature birth rates. In line with our findings in this study, Cebeci et al. found the birth weights of infants born to adolescent pregnants to be statistically lower, while they found the birth weeks to be similar.[9] In a previous study, which is consistent with the findings of this study, birth weights of babies born to adolescent pregnancies were statistically lower and SGA baby rates were statistically higher than the control group.[21] As many adolescents are still growing during pregnancy, they may challenge the fetus to supply their own needs and resulting in SGA babies.

In the present study, although the need for delivery room resuscitation was statistically higher in infants of adolescent mothers in our study, Apgar scores and frequency of asphyxia were not different. Similarly, in a study from Japan, asphyxia was not different among adolescents.[22] However, Kumar et al found that asphyxia was statistically more common in newborns born to adolescent mothers.[23] On the other hand, in their study, adverse maternal outcomes, such as premature delivery, preeclampsia and eclampsia, were more common, which may explain the difference between reports. Our study also revealed a statistically significant difference between groups in terms of NICU admission and the presence of hypoglycemia. This situation may have arisen due to increased SGA status in newborns born to adolescent mothers, as well as the lack of education of mothers on infant feeding due to irregular follow-ups during pregnancy. Consistent with our results, Shenoy et al found that newborns born to younger mothers had a higher incidence of NICU admission and hypoglisemia.[24] Moreover, they found the incidence of sepsis and asphyxia were similar between the groups as we determined in this study. Flemig et al. showed that neonates born to adolescent mothers had a significantly higher risk of admission to the NICU.[25] However, Kassa et al. found that it was not different between babies born from adolescent and adult women.[11]

Our study has several limitations, such as the retrospective design and contains only a small number of populations. In addition, for the same reason, we could not perform subgroup analyses among adolescents by age. Further detailed studies are needed to elucidate better the link between adolescent pregnancy and impaired neonatal outcomes.

Conclusion

Drawing on the findings obtained in the present study, babies born to adolescent mothers were at higher risk of having low birth weight, SGA status, hypoglycemia, needing delivery room resuscitation and NICU admission and adolescent pregnants had lower socio-cultural status and were less likely to have adequate antenatal care. Adolescent pregnancies should be considered high-risk pregnancies in terms of being associated with poor maternal and neonatal outcomes. Thus, appropriate antenatal and neonatal care should be provided to adolescents with regular follow-ups during pregnancy. At this stage, it should also be emphasized that the first and most important step in strategies to reduce adolescent pregnancies and associated poor neonatal outcomes should be to ''prevent it.'' For this purpose, the concept of child bride should be prevented with the increase in social awareness, and in addition, adolescents should be educated about healthy sexual life and contraception.

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References

1. Ganchimeg T, Ota E, Morisaki N, Laopaiboon M, Lumbiganon P, Zhang J, et al. Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. BJOG. 2014;121 Suppl 1:40-48.
2. WHO. World health statistics. Geneva: World Health Organization;2020.
3. World Health Organization (WHO). WHO guidelines on preventing early pregnancy and poor reproductive outcomes among adolescents in devoloping countries. Genava: WHO; 2011.
4. Kara T, Dogan K, Alyanak B, Akaltun I. An evaluation of sociodemographic characteristics and pregnancy-related psychological problems in pregnant adolescents. Ankara Med J. 2017;(3):151-9.
5. Korenčan S, Pinter B, Grebenc M, Verdenik I. The outcomes of pregnancy and childbirth in adolescents in Slovenia. Zdr Varst. 2017;56(4):268-275.
6. Marvin-Dowle K, Soltani H. A comparison of neonatal outcomes between adolescent and adult mothers in developed countries: A systematic review and meta-analysis. Eur J Obstet Gynecol Reprod Biol X. 2020;6:100109.
7. Wong SPW, Twynstra J, Gilliland JA, Cook JL, Seabrook JA. Risk Factors and Birth Outcomes Associated with Teenage Pregnancy: A Canadian Sample. *J Pediatr Adolesc Gynecol.* 2020;33(2):153-159.
8. Baş EK, Bülbül A, Uslu S, Baş V, Elitok GK, Zubarioğlu U. Maternal Characteristics and Obstetric and Neonatal Outcomes of Singleton Pregnancies Among Adolescents. Med Sci Monit. 2020;26:e919922.
9. Cebeci B, Kavuncuoglu S, Ercan TE, Eras Z, Cetinkaya M. Neonatal prognosis and outcomes in adolescent Pregnancies. Med Bull Haseki. 2021;59:37-42.
10. İleri A, İleri H, Ata C, Tosun G, Özeren M. Adolesan gebeliklerdeki maternal ve fetal sonuçların karşılaştırılması. Bozok Tıp Dergisi. 2020;10(1):24-29.
11. Kassa GM, Arowojolu AO, Odukogbe AA, Yalew AW. Adverse neonatal outcomes of adolescent pregnancy in Northwest Ethiopia. PLoS One. 2019;14(6):e0218259.
12. González-Andrade F, Saeteros-Cordero X. Pregnancy in adolescence and adverse neonatal outcomes in Ecuadorian mestizo newborns. *Pediatr Neonatol*. 2020;61(2):216-223.
13. Rexhepi M, Besimi F, Rufati N, Alili A, Bajrami S, Ismaili H. Hospital-Based Study of Maternal, Perinatal and Neonatal Outcomes in Adolescent Pregnancy Compared to Adult Women Pregnancy. Open Access Maced J Med Sci. 2019;7(5):760-766.
14. Marvin-Dowle K, Kilner K, Burley VJ, Soltani H. Impact of adolescent age on maternal and neonatal outcomes in the Born in Bradford cohort. *BMJ Open*. 2018;8(3):e016258.
15. Thirukumar M, Thadchanamoorthy V, Dayasiri K. Adolescent Pregnancy and Outcomes: A Hospital-Based Comparative Study at a Tertiary Care Unit in Eastern Province, Sri Lanka. Cureus. 2020;12(12):e12081.
16. Kawakita T, Wilson K, Grantz KL, Landy HJ, Huang CC, Gomez-Lobo V. Adverse maternal and neonatal outcomes in adolescent pregnancy. J Pediatr Adolesc Gynecol. 2016;29(2):130-136.
17. Torvie AJ, Callegari LS, Schiff MA, Debiec KE. Labor and delivery outcomes among young adolescents. Am J Obstet Gynecol. 2015;213(1):95.e1-95.e8.
18. Tsikouras P, Dafopoulos A, Trypsianis G, Vrachnis N, Bouchlariotou S, Liatsikos SA, et al. Pregnancies and their obstetric outcome in two selected age groups of teenage women in Greece. J Matern Fetal Neonatal Med. 2012;25(9):1606-1611.
19. Barut MU. Adolesan gebelerin maternal ve fetal sonuçlarının değerlendirilmesi. Dicle Med J.2018;45(3):283-290.
20. Sak S, İncebıyık A, Uyanıkoglu H, Turp AB, Hilali NG, Sak ME. Tersiyer Bir Merkezde Doğum Yapan Adolesan, Reprodüktif ve İleri Yaş Gebelerde Obstetrik ve Neonatal Sonuçların Karşılaştırılması. Zeynep Kamil Tıp Bülteni. 2017;*48*(3): 89-93.
21. Karataşlı V, Kanmaz AG, Inan AH, Budak A, Beyan E. Maternal and neonatal outcomes of adolescent pregnancy. J Gynecol Obstet Hum Reprod. 2019;48(5):347-350.
22. Suzuki S. Clinical significance of pregnancy in adolescence in Japan. J Matern Fetal Neonatal Med. 2019; 32(11):1864-1868.
23. Kumar A, Singh T, Basu S, Pandey S, Bhargava V. Outcome of teenage pregnancy. Indian J Pediatr. 2007;74(10):927-931.
24. Shenoy S, Hegde P, Khan H, Jaidev M. Study of the early neonatal outcomes in babies born to young and older mothers. Muller J Medical Sciences and Research. 2018;9(2):78.
25. Fleming N, Ng N, Osborne C, Biederman S, Yasseen AS, Dy J, et al. Adolescent pregnancy outcomes in the province of Ontario: a cohort study. *J Obstet Gynaecol Can*. 2013;35(3):234-245.