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Maternal Characteristics and Obstetric and Neonatal Outcomes of Singleton Pregnancies Among Adolescents

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Background: Adolescent pregnancy remains a global public health issue with serious implications on maternal and child health, particularly in developing countries. The aim of this study was to investigate maternal characteristics and obstetric and neonatal outcomes of singleton pregnancies among adolescents.





Material/Methods: A total of 241 adolescent women who gave birth to singletons between January 2015 and December 2015 at our hospital were included in this descriptive cross-sectional study. Data on maternal sociodemographic and obstetric characteristics as well as neonatal outcome were recorded.

Results: Primary school education (66.0%), lack of regular antenatal care (69.7%), religious (36.7%) and consanguineous (37.0) marriage, Southeastern Anatolia hometown (34.9%) and Eastern Anatolia hometown (21.2%) were noted in most of the adolescent pregnancies, while 95% were desired pregnancies within marriage. Pregnancy complications were noted in 19.5% (preeclampsia in 5.8%) and cesarean delivery was performed in 44.8% of adolescent pregnancies. Preterm delivery rate was 27.0% (20.3% were in >34 weeks). Overall, 13.3% of neonates were admitted to neonatal intensive care unit (NICU) in the postpartum period (prematurity in 28.1%), while 25.3% were re-admitted to NICU admission in the post-discharge 1-month (hyperbilirubinemia in 55.7%). Adolescent pregnancies were associated with considerably high rates of fetal distress at birth (28.7%), preterm delivery (26.9%), and re-admission to NICU after hospital discharge (25.3%).

Conclusions: In conclusion, our findings indicate that along with considerably high rates of poor antenatal care, maternal anemia and cesarean delivery, adolescent pregnancies were also associated with high rates for fetal distress at birth, preterm delivery, and NICU re-admission within post-discharge 1-month.

MeSH Keywords: Adolescent Medicine • Pregnancy in Adolescence • Prenatal Education

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Background

Adolescent pregnancy, a pregnancy in women aged between 10–19 years, is considered a prevalent social problem with serious implications on maternal and child health, particularly in developing countries [1–3]. Pregnancies that take place during adolescent age, when neither the biological nor the psychosocial maturation process is yet completed, adversely affect obstetric and neonatal outcomes due to biological immaturity, inadequate antenatal care, malnutrition, bad habits, stress, and mood-state disorders [4,5].

While early sexual intercourse, early marriage, young pregnancy, undesirable pregnancy, and sexually transmitted diseases are among the primary health problems affecting adolescents [4,5], low socioeconomic level, low level of education, and certain cultural factors also negatively affect adolescent pregnancies [5].

Data obtained from WHO yield that 16 million adolescents give birth each year. Of these births, 95% occur in countries with low- or middle-income levels. Pregnancy and childbirth complications are considered the most important reasons of death in these countries among girls aged 15–19 years [5]. Past studies on maternal and neonatal complications in adolescent pregnancies indicated that the prevalence of smoking, alcohol and drug dependence, maternal anemia, obstetric complication, stillbirth, low birth weight, premature birth, prenatal mortality, infant mortality and especially maternal malnutrition to be much higher in adolescent pregnancies compared to adult pregnancies [6–11].

According to the 2013 Turkish Demographic and Health Survey (TDHS-2013) data, adolescents make up 17.2% of the Turkish population, and the reported adolescent pregnancy rate is 4.6% [12]. However, maternal profile as well as perinatal and neonatal outcome of adolescent pregnancies in Turkey has been addressed in a limited number of studies. This study was therefore designed to determine the prevalence of adolescent pregnancies in our hospital and to investigate maternal characteristics and obstetric and neonatal outcomes of singleton pregnancies among adolescents

Material and Methods

Study population

A total of 3427 singleton deliveries were determined to be performed at our institution between January 2015 and December 2105 using the hospital records, including 271 adolescent pregnancies (in women aged 10–19 years). In total, 241 of 271

adolescent women who gave birth to singletons agreed to participate in this descriptive cross-sectional study

Written informed consent was obtained from each study participant or parent/legal guardian following a detailed explanation of the objectives and protocol of the study which was conducted in accordance with the ethical principles stated in the “Declaration of Helsinki” and approved by the Sisli Etfal Training and Research Hospital Ethics Committee (Date of approval: 2015, Protocol no: 603).

Assessments

Data on sociodemographic (age, educational level, marital status, type of marriage, age of husband, hometown, employment status, health insurance) and obstetric (gravidity, parity, regular antenatal follow-up, active smoking, maternal anemia, pregnancy complications, mode of delivery and indications for cesarean delivery) characteristics of adolescent women as well as the characteristics of neonates born to adolescent mothers [gestational age (week), birth weight (g), height (cm), head circumference (cm), 1-min and 5-min Apgar scores, small for gestational age (SGA), large for gestational age (LGA), and intrauterine growth retardation (IUGR) rates, fetal distress, preterm delivery, postpartum breastfeeding time, neonatal intensive care unit (NICU) admission and mortality] were recorded. All adolescent mothers participated in the study were contacted via a phone call 1 month after the delivery to collect data on presence and causes of any post-discharge NICU re-admission of neonates within post-discharge 1-month.

Obstetric outcome

Maternal obstetric outcome was assessed based on pregnancy-related complications including anemia (hemoglobin concentration <11 g/dL), prolonged rupture of membrane (PROM), gestational hypertension (blood pressure $>140/90$ mmHg in women with proteinuria <0.3 g/24 hour urine collection), pre-eclampsia (blood pressure $>140/90$ mmHg and proteinuria >0.30 g/24 hour urine collections) and placental abruption.

Neonatal outcome

Neonatal outcome was assessed based on perinatal [preterm delivery (<37 completed weeks), intrauterine fetal death (delivery of a dead infant after 22 week' gestation), low Apgar score at first minute <7 and NICU admission, birth weight adjusted for gestational age; small-for-gestational-age (SGA, defined as <-2 SD), average-for-gestational-age (AGA) and large-for-gestational-age (LGA, defined as $>+2$ SD)] and post-natal 1-month (NICU readmission rate and reasons) outcomes.

Statistical analysis

Statistical analysis was made using IBM SPSS Statistics for Windows, version 19.0 (IBM Corp., Armonk, NY, USA). Chi-square (χ^2) test was used for the comparison of categorical data, while Student *t*-test was used for analysis of the parametric variables. Data were expressed as mean±standard deviation (SD), minimum-maximum and percent (%) where appropriate. *P*<0.05 was considered statistically significant.

Results

In 2015, 3427 births occurred in our hospital. Of these births, 7.9% (n=271) were found to be adolescent births.

Maternal characteristics

Mean age of adolescent mothers was 17.2 years (range, 14 to 19 years, 82.6% aged 17–19 years). Most of women were primary school graduates (66.0%), while majority (96.0%) was married. The religious and consanguineous marriage rates were 36.7% and 37.0%, respectively. Southeastern Anatolia (34.9%) was the most common hometown of adolescent mothers as followed by Eastern Anatolia (21.2%). Only 1.2% of women were employed and 58.5% had health insurance (Table 1).

Obstetric outcome

Considering obstetric characteristics, mean gravidity and parity were 1.07 (range, 1 to 4) and 1.04 (range, 1 to 3), respectively. Most of women (69.7%) did not receive regular antenatal care, while rates for active smoking and maternal anemia were 10.0% and 33.6%, respectively (Table 1).

None of the adolescent mothers reported previous sexuality education or use of any contraceptive methods. Overall, 95% (n=229) of the adolescent pregnancies were reported to be desired pregnancies. While 83.4% (n=201) of the pregnancies were nulliparous, second and third pregnancy rates were 15.3% (n=37) and 1.2% (n=3) in the study.

Maternal anemia was evident in 81 adolescent women (33.6%) with mean hemoglobin value of 10.2±0.9 g/dL (range, 6.4 to 15.6 g/dL). Mean weight gain throughout pregnancy was 15.5±3.2 kg (range, 5 to 41 kg). Pregnancy complications were noted in 19.5% of women and preeclampsia (5.8%) was the most common complication. Cesarean delivery was noted in 44.8% of women, while fetal distress (28.7%), cephalopelvic disproportion (18.5%), and prolonged labor (16.0%) were the 3 most common reasons for cesarean delivery (Table 1).

Neonatal characteristics

Mean gestational age was 37.4 weeks (range, 25 to 40 weeks), while preterm delivery rate was 27.0% (20.3% were in >34 weeks of gestation). The mean birth weight of neonates from adolescent pregnancies was 3.070 g (range, 830 to 4430 g) (Table 2). Overall, rates for small for gestational age (SGA), and intrauterine growth retardation (IUGR) were 3.7% and 1.6%. The Apgar scores were 7.6 (range, 4 to 8) and 8.7 (range, 6 to 10), at 1-minute and 5-minute, respectively. First breastfeeding occurred > 1 hour postpartum in 64.3% of neonates (Table 2).

Neonatal outcome

Rates for fetal distress at birth, preterm delivery and neonatal death were 28.7%, 26.9%, and 0.8%, respectively (Table 3).

Overall, 13.3% of neonates born to adolescent mothers were admitted to NICU in the postpartum period, while prematurity (28.1%) and feeding intolerance (25.0%) were the most common reasons for NICU admission (Table 3).

After discharge, NICU re-admission occurred in 25.3% of neonates due to hyperbilirubinemia (55.7%) or inadequate weight gain (34.4%) in most of cases (Table 3).

Discussion

Our findings revealed an annual rate of 7.9% for adolescent pregnancies at our hospital, which were desired pregnancies within a marriage in majority of cases. High rates of poor education (66.0%), religious (36.7%) and consanguineous marriage (37.0%) were noted along with Southeastern/Eastern Anatolia as the most common hometown.

The prevalence of adolescent pregnancies (7.9%) in our hospital-based study seems consistent with previously reported range (3.5% to 12%) of adolescent pregnancies in Turkey [6,12–17], while indicating lower prevalence of adolescent pregnancies in Turkey as compared with the World Health Organization (WHO) global data (11%) [5]; and also the data from some developing [8,9,18–22] and developed [7,21,22] countries indicated up to 50% and 21% adolescent pregnancy rates, respectively. Nonetheless, our findings support the higher likelihood of pregnancies in late adolescence years (18–19 years of age) [5]. Notably, while most of the adolescent pregnancies in developed countries are out of wedlock, undesired, and unplanned pregnancies [20,23], majority of women were married, and pregnancies were desired pregnancies in our cohort. Notably, in developing countries such as Turkey, sociocultural traditions, poor economic conditions, and low levels of education are the most important factors that increase early marriage

Table 1. Maternal characteristics and obstetric outcome of adolescent mothers.

Sociodemographic characteristics			
	Mean±SD (min–max)	17.2±0.9	(14.0–19.0)
Age (year),	14–17 years, n (%)	42	(17.4)
	17–19 years, n (%)	199	(82.6)
Educational level, n (%)	Illiterate	6	(2.5)
	Primary education	159	(66.0)
	Secondary education	76	(31.5)
Marital status, n (%)	Married	231	(96.0)
	Single	10	(4.0)
Type of marriage, n (%)	Formal	146	(63.3)
	Religious	85	(36.7)
Duration of marriage (year), mean±SD (min–max)		1±0.3	(1.0–4.0)
Age of husband (year), mean±SD (min–max)		25.9±3.1	(18.0–31.0)
Consanguineous marriage, n (%)	Total	89	(37.0)
	1 st degree	44	(49.5)
	2 nd degree	28	(31.5)
	3 rd degree	17	(19.0)
Hometown, n (%)	Southeastern Anatolia	84	(34.9)
	Eastern Anatolia	51	(21.2)
	Northern Anatolia	37	(15.4)
	Central Anatolia	34	(14.1)
	West Anatolia	38	(14.6)
Employed, n (%)		3	(1.2)
Health insurance (yes), n (%)		141	(58.5)
Obstetric characteristics			
Gravidity, mean±SD (min–max)		1.07±0.26	(1.0–4.0)
Parity, mean±SD (min–max)		1.04±0.19	(1.0–3.0)
Regular antenatal follow-up, n (%)		168	(69.7)
Active smoking, n (%)		24	(10.0)
Maternal anemia, n (%)		81	(33.6)
Weight gain throughout pregnancy (kg), mean±SD (min–max)		15.5±3.2	(5.0–41.0)
Desired pregnancy, n (%)		229	(95.0)
Pregnancy complications, n (%)		47	(19.5)
Preeclampsia		14	(5.8)
Gestational diabetes		9	(3.7)
Oligohydramnios		8	(3.3)
Prolonged rupture of the membrane		5	(2.1)
Placental abruption		4	(1.6)
Psychological problem		4	(1.6)
Eclampsia		3	(1.2)
Mode of delivery, n (%)			
Normal spontaneous delivery		133	(55.2)

Table 1 continued. Maternal characteristics and obstetric outcome of adolescent mothers.

Cesarean delivery	108	(44.8)
Indications for cesarean delivery, n (%)		
Fetal distress	31	(28.7)
Cephalopelvic disproportion	25	(18.5)
Prolonged labor	17	(16.0)
Preeclampsia	10	(9.3)
Abnormal presentation	9	(8.3)
Repeat caesarean section	6	(5.5)
Abnormal placentation	6	(5.5)
Oligohydramnios	4	(3.7)

Table 2. Characteristics of neonates born to adolescent mothers.

Birth weight (g), mean±SD (min–max)	3.070±566	(830.0–4430.0)
Height (cm), mean±SD (min–max)	48.3±2.9	(33.0–53.0)
Head circumference (cm), mean±SD (min–max)	33.6±1.8	(23.0–38.0)
Gestational age (week), mean±SD (min–max)	37.4±2.0	(25.0–40.0)
Term delivery	176	(73.0)
Preterm delivery	Total	65 (27.0)
	>34 weeks	49 (20.3)
	32–34 weeks	7 (2.9)
	28–32 weeks	5 (2.1)
	<28 weeks	4 (1.7)
APGAR score, mean±SD (min–max)	1-min	7.6±0.5 (4.0–8.0)
	5-min	8.7±0.5 (6.0–10.0)
Small for gestational age, n (%)	9	(3.7)
Large for gestational age, n (%)	14	(5.8)
Intrauterine growth retardation, n (%)	4	(1.6)
Congenital anomaly, n (%)	0–30 min	24 (10.0)
	30 min–1 hour	62 (25.7)
	>1 hour	155 (64.3)

and fertility rate [24–26]. Unfortunately, “young motherhood” is usually accepted and even promoted in some traditional culture, including certain regions of Turkey. In fact, given that mothers of the adolescent mothers in the current study were also in adolescent age during their first pregnancy, our finding suggests consideration of adolescent marriage and pregnancy as normal by the families of the participating adolescent women. Similarly, high adolescent birth rates among certain populations have been linked to the practice of child marriage to remain prevalent in these communities, where girls often have no choice but to follow tradition, leave school and get

married in young age, thus perpetuating a cycle of poor education, poverty and early childbirth [3,27,28].

Early marriages are quite widespread in Turkey, although the legal age of marriage for both women and men is 18 years [29]. Accordingly, while majority of adolescent mothers were married women in our cohort, one third of these marriages were religious and not legal marriages. In our cohort, married adolescent women were average 7 years younger than their spouse, supporting the 2013 data from Turkish Demographic and Health Survey (TDHS) and Turkish Statistical Institute

Table 3. Neonatal outcome and Intensive Care Unit admission rates.

Neonatal outcome, %	
Fetal distress	69 (28.7)
Preterm delivery	65 (27.0)
Post-partum neonatal ICU admission	32 (13.2)
Neonatal death	2 (0.8)
Neonatal intensive care (NICU) admission, n (%)	
Prematurity	9 (28.1)
Feeding intolerance	8 (25.0)
Respiratory distress syndrome	5 (15.6)
Neonatal transient tachypnea	5 (15.6)
Congenital anomaly	2 (6.3)
Meconium aspiration syndrome	1 (3.15)
Polycythemia	1 (3.2)
Asphyxia	1 (3.2)
NICU readmission after hospital discharge, n (%)	
Hyperbilirubinemia	34 (55.7)
Inadequate weight gain	21 (34.4)
Sepsis	3 (5.0)
Urinary tract infection	2 (3.3)
Pneumonia	1 (1.6)

indicated 43% of the spouses of adolescent mothers to be in the 25–29-years age group and 53% of spouses to have an average 7 years (range, 5 to 9 years) of age difference [12,30]. This may be due to several sociocultural reasons, such as the fact that men can continue their education for longer, have a mandatory military duty, and are expected have a regular job.

The ratio of consanguineous marriages in adolescent pregnancies in our study was higher than overall rate of consanguineous marriages in Turkey in general and based on the national population health statistics [12,31]. Notably, in a past study from Turkey, authors reported the likelihood of higher rate of consanguineous marriages in the adolescent age (20.7%) as well as in case of presence of consanguineous marriages in the previous generation [32]. This seems to suggest that

consanguineous marriage is an established, accepted tradition in terms of social behavior in Turkish society.

In our study, it was found that adolescent marriages, consanguineous marriages, and religious marriage were more frequent in the families who migrated from the Southeastern Anatolia and Eastern Anatolia regions where the overall socio-economic conditions and education levels are poorer than in the other regions of Turkey. This support the high rates (32.7%) of religious marriage reported among adolescent women in Turkey, particularly those from families migrated from Eastern Turkey [6]. Similarly, 2013 data from TDHS revealed regional differences in the incidence of adolescent pregnancies across Turkey with 3% in the Western regions and >6% in the Southern, Central and Eastern Anatolian regions [12].

Low educational level and low employment rate of adolescent mothers in our cohort also support data from Turkey Population and Health Research in 2013 revealed a reverse association of adolescent pregnancy with both welfare and level of education, and an increase in the rate of adolescent pregnancies with decrease in the socioeconomic level of the family (from 3.0% to 6–8%) as well as with poorer educational level of women (17% versus 8%) [12]. Notably, some studies indicated not only early marriage in some traditional rural communities but also low educational level and low level of sexual education and contraceptive use and high rate of poverty amongst the important factors in the rate of adolescent pregnancy [3,33]. Hence, given that nearly 15% of adolescent women were pregnant for the second time during the study period and none reported previous education about sexuality or use of any contraceptive methods, our findings support the consideration of prevention of early marriage as well as postnatal family planning information and service provision as critical measures in prevention of adolescent pregnancy [5,34].

Indeed, while, especially unintended adolescent pregnancies are considered likely to carry a greater risk of adverse consequences in developing countries with limited health resources and restrictive abortion laws [3], poor rates of sufficient antenatal care, as strongly associated with the possible complications, has been reported in adolescent pregnancies, even for a desired pregnancy [8,26,34,35]. In a recent study the average gestational age to start antenatal follow-up was reported to be nearly 3 weeks late for adolescents than adult women, while authors emphasized the central role of female education and women empowerment in improved antenatal care utility among adolescents [34]. Similarly, in our study, while majority of pregnancies were desired pregnancies, one-third of adolescents had insufficient antenatal follow-up. Indeed, adolescent pregnancy has consistently been reported to be related to poorer antenatal care compared to adult women [3,36–38], as suggested to be associated with higher likelihood of a teenage

pregnancy to occur in a socially deprived society, resulting in adolescent mothers to less likely attend antenatal care clinics, due to economic and social barriers [39,40].

In our cohort of adolescent pregnancies, maternal anemia and active smoking rates were 33.6% and 10.0%, respectively. The reported prevalence of anemia in adolescent pregnancies, in both national and international studies, is higher than that in adult pregnancies [6,10,18]. In addition to slowing down fetal growth, increasing perinatal mortality and causing miscarriage, smoking during pregnancy is also a cause of low birth weight for 1 in every 3 babies and preterm labor in 1 of 6 [41,42]. In a study conducted with 945 adolescent pregnant women in Turkey, smoking rates were reported to be high (19.2%), similar to our findings [6]. This situation has been associated with lack of knowledge, low level of education, nutritional deficiencies that are especially common in adolescent period, low income level, and lack of antenatal care and counseling.

In our cohort, maternal complications were noted in 19.5% of adolescent women, while the most common complication associated with adolescent pregnancy was preeclampsia, supporting the consideration of hypertension amongst the 4 most common causes of maternal and perinatal mortalities worldwide [35] as well as higher likelihood of preeclampsia in adolescent pregnancies [15,23–26,43]. Increased metabolic rate, inadequate prenatal care, and low socioeconomic and educational level have been associated with increase in the prevalence of preeclampsia and eclampsia in adolescent pregnant women [23–26].

In the current study, cesarean delivery rate among adolescent pregnancies was 44.8%, and due to fetal distress (28.7%), cephalopelvic disproportion (18.5%), and prolonged labor (16.0%) in most of cases. This seems to support the consideration of cephalopelvic disproportion or prolonged labor to be likely to necessitate emergency obstetric care and delivery by cesarean section among adolescents in relation to physical immaturity and incomplete bone development [17,43,44].

The rate of caesarean delivery among adolescent pregnancies in our study was similar to the general caesarean delivery rate (41.6%) in our hospital, and the high cesarean rates seems to be in line with the fact that our clinic is a tertiary care referral center that serves for women with high-risk pregnancies and obstetric problems referred to our clinic from external centers. Nonetheless, past studies revealed inconsistent data on cesarean rates among adolescent pregnancies indicated lower cesarean rate among adolescent pregnancies [3,12,17,45–47] as well as no change in cesarean births between adolescent and adult pregnancies [48], while association of adolescent pregnancy with higher rate of cesarean birth due to fetal distress (31.3% versus 20%) was also reported [15]. Hence, it was noteworthy that fetal distress was the indication in one-third

of the cesarean deliveries in adolescent pregnancies in our hospital cohort.

Neonatal outcomes in our study revealed preterm delivery in 27.0% of neonates, whereas >34 week gestational age in 20.3% of preterm neonates, while low rates were noted for IUGR (1.6%), premature labor (6.6%), congenital anomaly (0.8%), and early neonatal death (0.8%). This seems notable given the incidence rates of low birthweight (9.5%), preterm delivery (13%), congenital anomaly (1.5%), stillbirth (1.8%), and early neonatal death (1.7%) reported in Turkish population of all age groups [49]. In a recent study from Turkey, authors reported rates of IUGR, premature labor, and congenital anomalies among adolescent pregnancies to be 3.81%, 9.09% and 1.46%, respectively [1].

Preterm labor is observed in 7–12% of all pregnancies [50] and at high rates among adolescent pregnancies [15,51–53]. Preterm delivery rates in adolescent pregnancies in our cohort support the consistently reported high prevalence of preterm delivery among adolescent pregnancies (7.9% to 18.2%), particularly amongst the youngest (13-year-olds, 14.5%) mothers [3,36,54]. Nonetheless, high prevalence of late preterm cases in our study seems notable given that premature birth was the most common cause of NICU admission among neonates. This supports the data from a past study from Turkey, indicated prematurity as the most common reason for NICU admission among neonates born to adolescent mothers [24].

In a past study among adolescent mothers, authors reported that 66.2% of 442 adolescent mothers breastfed first following the 1st hour, while time to initial breastfeeding could prolong up to 2 days [55]. Likewise, breastfeeding was performed by majority of adolescent mothers in our study only after postpartum 1st hour, despite the initiation of breastfeeding within 1 hour after childbirth is considered to ensure that neonate receives adequate nutrition and protective antibodies from colostrum [56]. Adolescent mothers' increased anxiety levels following labor, insufficient knowledge and experience of nursing, and lack of sufficient support from family and health personnel may be interpreted as causes of this condition.

Our findings indicate high rates for fetal distress at birth (28.7%), preterm delivery (27.0%), and re-admission to NICU within 1-month post-discharge (25.3%) due to in hyperbilirubinemia (55.7%) or inadequate weight gain (34.4%) in most of cases. These findings seem to emphasize a need for a longer length of postpartum hospital stay in adolescent pregnancies in terms of provision of sufficient education about maternal adaptation and infant care and nutrition. Similarly, association of adolescent pregnancy with an increased rate of re-hospitalization was also reported in a past study and authors noted a need for training and support to prevent re-hospitalizations [57].

Conclusion and Implications

In conclusion, the current hospital-based study revealed 7.9% of all neonates to be born to adolescent mothers in our hospital in 2015. Our findings indicate a low educational level, high rates of marriage and desired pregnancy and higher likelihood of being from Eastern region of Turkey among adolescent mothers. Along with considerably high rates of poor antenatal care, maternal anemia and cesarean delivery, adolescent pregnancies were also associated with considerably high rates for fetal distress at birth, preterm delivery and NICU re-admission within post-discharge 1-month. Accordingly, our findings emphasize the role of optimal antenatal care and postnatal care ensuring sufficient support from family and health personnel in better maternal and neonatal outcomes of adolescent pregnancies. In addition to quality health care services, a dedicated national educational policy to promote education among adolescent girls, as well as implementation of social studies to prevent adolescent marriages seems necessary to reduce

the burden of adolescent pregnancy in the developing world. Additionally, we also believe that the primary health care services need to be activated more efficiently in order to provide appropriate maternal and neonatal care for the current adolescent pregnancies.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of interests

None.

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