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Abstract

Introduction: Adolescent pregnancy remains a global public health challenge that contributes to adverse maternal and neonatal outcomes and hinders progress toward the Sustainable Development Goals (SDGs), particularly SDG 3 on ensuring healthy lives and promoting well-being for all.

Objectives: To compare the maternal and neonatal outcomes of adolescent and optimal-age pregnancies among women at a tertiary referral hospital in Alexandria, Egypt, and describe their sociodemographic and clinical characteristics.

Methods: A hospital-based comparative cross-sectional study was conducted at El Shatby University Hospital, Alexandria, Egypt, between September 2024 and March 2025. A total of 800 women were enrolled using convenience sampling and categorized into adolescent (<20 years) and optimal-age (20–30 years) groups. Sociodemographic, obstetric, and neonatal data were collected through structured interviews and medical record review. Outcomes were compared using descriptive and inferential statistical tests, with statistical significance set at $p < 0.05$.

Results: Of the 800 participants, 19.4% were adolescents. Compared with women aged 20–30 years, adolescent mothers had significantly higher rates of urinary tract infection (34.0% vs. 25.0%, $p = 0.025$), preterm labour (25.8% vs. 14.4%, $p = 0.001$), premature rupture of membranes (40.6% vs. 27.3%, $p = 0.001$), and low birth weight (34.8% vs. 22.8%, $p < 0.001$). They also had higher rates of birth before 34 weeks (28.4% vs. 19.0%) and neonatal intensive care unit admission (36.0% vs. 22.0%) (both $p < 0.001$).

Conclusion: Adolescent pregnancy was associated with increased maternal and neonatal morbidity. Preventive strategies and timely, high-quality antenatal care are needed to reduce its health burden and improve maternal and neonatal outcomes.

Key words; adolescent pregnancy, maternal outcomes, foetal outcomes

Introduction

Adolescence, defined as the period between 10 and 19 years of age, represents a distinct developmental stage that bridges childhood and adulthood. Adolescent pregnancy, according to the World Health Organization (WHO), refers to pregnancy occurring in females younger than 20 years of age. (1) Pregnancy during this developmental period imposes added physiological and metabolic demands on the mother, potentially compromising maternal adaptation to pregnancy and adversely affecting fetal growth and development. (2)

Globally, approximately 21 million girls aged 15–19 years become pregnant each year, with an estimated 12 million resulting in live births. (3) The burden of adolescent pregnancy is concentrated in low- and middle-income countries (LMICs), where many young women encounter limited access to reproductive health information, contraceptive services, and adolescent-friendly healthcare. (4) In these settings, complications related to pregnancy and childbirth continue to be a major cause of morbidity and mortality among adolescent girls. Furthermore, the risk of maternal death among adolescent mothers has been estimated to be 1.5–2 times greater than that observed among women aged 20–24 years. (3)

Adolescent pregnancy is linked to an increased burden of morbidity, with young mothers exhibiting approximately 20–30% higher rates of obstetric complications compared to adult women. (5) When compared to women of ideal reproductive age, the intricate interaction of biological immaturity, social adversity, and health system limitations results in a significantly increased risk of unfavorable maternal and neonatal outcomes. (6, 7)

Adolescent mothers are at increased risk of several pregnancy-related complications, including anaemia, infections, preterm labour, and hypertensive disorders of pregnancy. Evidence indicates that adolescents experience higher rates of preterm birth and are more likely to develop preeclampsia and eclampsia than women of older reproductive age. (5, 6) In addition, maternal infections, particularly puerperal sepsis, occur more frequently among adolescent mothers and contribute substantially to maternal morbidity. Collectively, these complications often necessitate closer antenatal surveillance and increased obstetric care during pregnancy and childbirth. (8)

Labour-related complications are also more common among adolescents. Studies have reported an increased likelihood of prolonged and obstructed labour compared with women aged 20–24 years. Biological immaturity, including an underdeveloped pelvis, may predispose adolescent mothers to cephalopelvic disproportion and labour dystocia, thereby increasing the need for operative delivery and emergency caesarean section. These risks are particularly pronounced in low- and middle-income countries, where access to timely obstetric care may be limited. (8, 9)

Given the elevated risks associated with adolescent pregnancy, timely identification and appropriate clinical management are essential. This includes early initiation of antenatal care, closer monitoring throughout pregnancy, and coordinated multidisciplinary support tailored to the specific medical, psychological, and social needs of adolescent mothers. (5, 10) Despite ongoing efforts to improve maternal and child health, adolescent pregnancy continues to represent an important public health challenge in Egypt due to its association with adverse maternal and neonatal outcomes.

Objectives

The study aimed to assess and compare the maternal and fetal outcomes of adolescent and optimal-age pregnancies among labouring women attending El-Shatby Hospital, while describing their sociodemographic and clinical characteristics.

Methods

Study Design: a cross-sectional study was implemented over a six-month period, from 1 September 2024 to 1 March 2025, following approval by the local Ethics Committee.

Study Setting: the study was conducted at the Department of Obstetrics and Gynecology, El Shatby University Hospital, Alexandria University, Egypt. As a tertiary referral center, the hospital provides comprehensive obstetric and gynecological care to patients from Alexandria and neighboring governorates. The hospital conducts approximately 30,000 deliveries annually and offers round-the-clock emergency obstetric services, specialized care for high-risk pregnancies, and continuous coverage by resident physicians and consultants.

Study population: pregnant women presenting for delivery at Elshatby University Hospital during the study period.

Sampling*:* a convenience sampling technique was adopted. All pregnant women admitted to the labour ward during the study period who met the eligibility criteria were included in the study.

Inclusion criteria comprised pregnant women aged <20 years (adolescents) or 20–30 years (optimal reproductive age), regardless of gravidity, presenting with either term or preterm labour after 20 weeks of gestation.

Exclusion criteria included pre-existing chronic medical conditions (e.g., chronic hypertension, type 1 diabetes mellitus, cardiac or autoimmune diseases), use of medications known to affect pregnancy outcomes, multiple gestations, and incomplete medical records.

Data collection methods and tools*:* Data were collected through medical record review and face-to-face interviews using a structured data collection form developed by the researcher after rigorous literature review (56). Information obtained included socio-demographic characteristics, such as age at delivery, educational level, occupation, and place of residence. Obstetric and medical history data were also recorded, including gravidity, parity, history of abortion, previous and current pregnancy complications, as well as relevant medical history.

Outcome Measures

Maternal outcomes included medical complications such as anemia (hemoglobin concentration below 11 g/dL), urinary tract infection, preeclampsia, and gestational diabetes mellitus, as well as obstetric complications including antepartum hemorrhage, postpartum hemorrhage, birth trauma, and intensive care unit admission. The mode of delivery was also documented and categorized as vaginal delivery (spontaneous or induced) or cesarean section, with indications for cesarean delivery recorded.

Fetal outcomes included gestational age at delivery, birth weight, and neonatal morbidity indicators. Neonatal morbidity was assessed through the occurrence of birth hypoxia (Apgar score <7), admission to the neonatal intensive care unit (NICU), and the presence of congenital anomalies diagnosed clinically or by ultrasonography.

Plan for data analysis: data were analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 28.0 (IBM Corp., Armonk, NY, USA). Data were coded, entered, and validated prior to analysis, and appropriate procedures were undertaken to identify and address missing data. Descriptive statistics were used to summarize the study variables. Continuous variables were presented as mean ± standard deviation (SD) or median and interquartile range (IQR) depending on the distribution of the data, while categorical variables were expressed as frequencies and percentages. Results were presented using appropriate tables and graphical displays. Comparisons between study groups were performed using the independent-samples t-test for normally distributed continuous variables and the Mann–Whitney U test for non-normally distributed variables. Categorical variables were compared using the Chi-square test or Fisher's exact test when appropriate. A p-value of less than 0.05 was considered statistically significant.

Ethical consideration: The study protocol was approved by the Research Ethics Committee of the Faculty of Medicine, Alexandria University (15 October 2024) & IRB No:00012098 . Administrative approval was also obtained from the Department of Obstetrics and Gynecology, El Shatby University Hospital. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Participation was voluntary and all participants provided verbal consent. Confidentiality and anonymity were maintained throughout the study, and all collected data were used solely for research purposes and were accessible only to the research team.

Pilot Study: prior to the start of data collection, a pilot study was undertaken involving 20 pregnant women, with 10 participants recruited from each age group. The pilot study was conducted to evaluate the applicability of the data collection tools, assess the feasibility of the study procedures, identify potential operational challenges, and estimate the time required for data collection from each participant. Necessary modifications were made based on the pilot findings before initiating the main study.

Results

A total of 800 pregnant women admitted to El Shatby University Hospital over the six-month study period were included. Of these, 19.4% were adolescents (<20 years) at the time of delivery (Figure 1). The age of the studied ranged from 15 to 30 years, with a mean of 23.86 ± 4.12 years. The younger age group (<20 years) had a mean age of 18.18±0.95 while participants aged 20 years and above had a mean age of 23.86 ± 4.12 years. This difference was statistically (P value <0.001).

Table 1 describes distribution of participants according to their age and selected socio-demographic characteristics. Regarding occupation, adolescent mothers were significantly more likely to be housewives than women aged 20 years or older (96.1% vs. 80.6%), whereas employment and manual work were more common among the older age group. This difference was statistically significant ($p < 0.001$). Regarding residence, women aged 20 years or older were significantly more likely to reside in urban areas. This difference was statistically significant ($p < 0.001$). Educational attainment differed significantly between the two age groups. Adolescent mothers had lower levels of education, with a substantially higher proportion being illiterate compared with women aged 20 years or older.. This difference was statistically significant ($p < 0.001$).

Table 2 describes distribution of participants according to their age and obstetric history. Adolescent mothers had significantly lower gravidity and parity than women aged 20 years or older, indicating that they were more likely to be experiencing their first pregnancy and had less reproductive experience overall ($p < 0.001$). The majority of participants (97.9%) reported no history of abortion. However, the mean number of previous abortions was significantly lower among adolescent mothers compared with women aged 20 years or older, reflecting their lower reproductive history ($p < 0.001$). Gestational age at delivery was slightly lower among adolescent mothers compared with women aged 20 years or older. This difference was statistically significant ($p = 0.035$). Regarding obstetric history, approximately two-fifths of the participants were primigravida, while the remainder had a history of previous

deliveries. Adolescent mothers were significantly more likely to be primigravida. This difference was statistically significant ($p < 0.001$).

Table 3 describes distribution of participants according to their age and selected clinical profile data. Vital signs, including blood pressure, pulse rate, and body temperature, were generally comparable between the two age groups, with no statistically significant differences observed. In contrast, adolescent mothers had a significantly lower mean body mass index (BMI) than women aged 20 years or older ($p < 0.001$). Regarding laboratory findings, hemoglobin levels and random blood sugar values were similar in both groups, whereas white blood cell counts were significantly higher among adolescent mothers ($p = 0.006$).

Table 4 describes distribution of participants according to their age and medical complications during delivery. Nearly half (56.5%) of participants experienced at least one medical complication during pregnancy. The prevalence of medical complications was comparable between both age groups, with no statistically significant difference observed. However, urinary tract infections were significantly more common among adolescent mothers than among older women ($p = 0.013$). In contrast, gestational hypertension and thrombocytopenia were slightly more prevalent among women aged 20 years or older, although these differences did not reach statistical significance.

Table 5 describes distribution of participants according to their age and obstetric complications during delivery. Nearly half (51.2%) participants experienced at least one obstetric complication during pregnancy. Obstetric complications were significantly more common among adolescent mothers than among women aged 20 years or older ($p = 0.001$). Adolescent pregnancy was particularly associated with higher rates of preterm labor, premature rupture of membranes, and oligohydramnios. Although meconium-stained amniotic fluid, polyhydramnios, and chorioamnionitis tended to occur more frequently among younger mothers, these differences were not statistically significant. Similarly, no significant differences were observed between the two age groups regarding antepartum hemorrhage, postpartum hemorrhage, or birth trauma.

Table 6 describes distribution of participants according to occurrence of abnormal fetal outcome. More than third (39.1%) participants experienced at least one adverse fetal outcome. These outcomes were significantly more common among adolescent mothers than among women aged 20 years or older (52.3% vs. 36.0%). Adolescent pregnancy was associated with a higher risk of low birth weight, lower Apgar scores, neonatal hypoxia, NICU admission, and preterm delivery, with all differences reaching statistical significance. In contrast, no significant differences were observed between the two age groups regarding intrauterine growth restriction, intrauterine fetal death, congenital anomalies, birth asphyxia, or neonatal mortality.

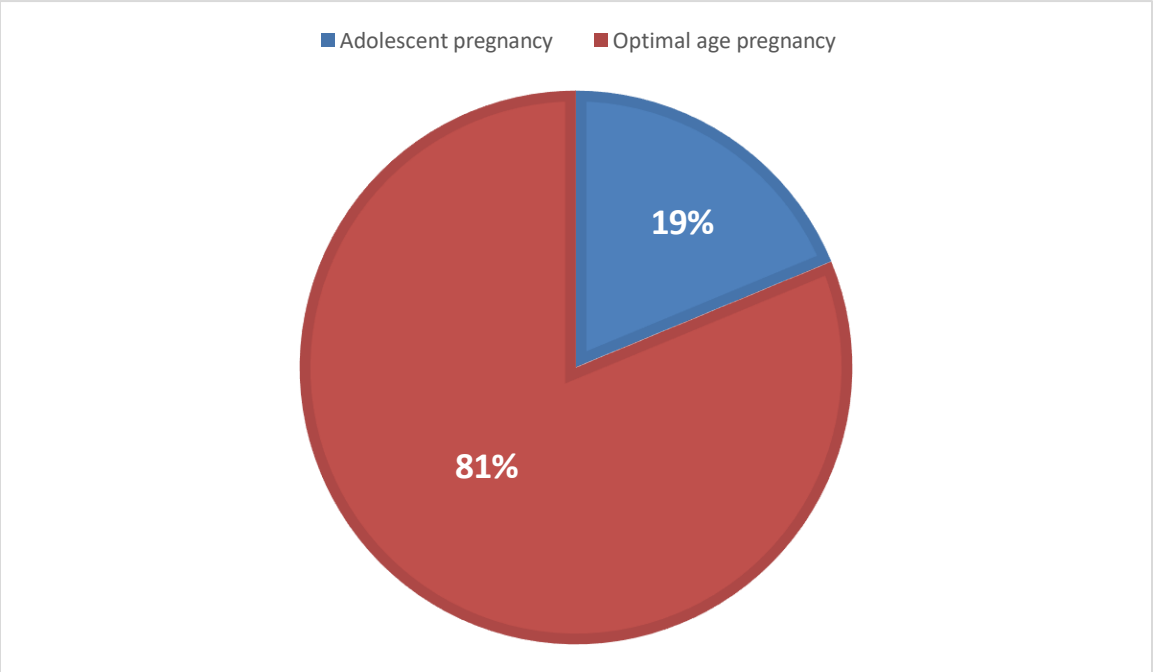


Figure 1. Age distribution of pregnant women at the time of delivery at El-Shatby Maternity Hospital, Alexandria, Egypt, during the study period (n = 800).

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Table 1: Distribution of laboring females who attend El-Shatby Maternity Hospital, Alexandria according to their age and selected socio-demographic characteristics.

Characteristic	Total (n=800)		<20 year (n=155)		≥20 years (n=645)		Test of significance	(p - value)
	No.	%	No.	%	No.	%		
Job								
Housewife	669	83.6	149	96.1	520	80.6		
Worker	82	10.3	5	3.2	77	11.9	**MC_p** 22.274*	<0.001*
Employee	49	6.1	1	0.6	48	7.4		
Residence								
Urban	567	70.9	79	51.0	488	75.7	**χ^2** 36.908*	<0.001*
Rural	233	29.1	76	49.0	157	24.3		
Education								
Illiterate	153	19.1	63	40.6	90	14.0		
Basic education	633	79.1	92	59.4	541	83.9	**χ^2** 59.414*	<0.001*
High education	14	1.8	0	0.0	14	2.2		

χ^2: Chi-Square test. **MC:** Monte Carlo: *significant at P≤0.05

Table 2: Distribution of laboring females who attend El-Shatby Maternity Hospital, Alexandria according to their age and obstetric history.

Obstetric History	Total (n=800)		<20 year (n=155)		≥20 years (n=645)		Test of sig.	p
	No.	%	No.	%	No.	%		
Gravidity								
Mean ± SD.	2.59 ± 1.81		1.32 ± 0.62		2.90 ± 1.86		U= 18555.5*	<0.001*
Median (IQR)	2.0 (1.0 – 3.0)		1.0 (1.0 – 1.0)		2.0 (2.0 – 4.0)			
Parity								
Mean ± SD.	1.12 ± 1.18		0.15 ± 0.36		1.35 ± 1.19		U= 18159.5*	<0.001*
Abortion								
Mean ± SD.	0.47 ± 1.14		0.15 ± 0.46		0.55 ± 1.24		U= 40379.0*	<0.001*
Ectopic								
Ep1	4	0.5	2	1.3	2	0.3	χ^2= 2.414	FE_p= 0.171
Vesicular mole								
Yes	3	0.4	1	0.6	2	0.3	χ^2= 0.376	FE_p= 0.476
Single or multiple								
Single	735	91.9	137	88.4	598	92.7	χ^2= 3.133	0.077
Multiple	65	8.1	18	11.6	47	7.3		
Gestational age GA (wks.)								
Mean ± SD.	36.36 ± 3.70		35.74 ± 4.19		36.51 ± 3.55		t= 2.125*	0.035*
Obstetric history								
Normal vaginal delivery	169	21.1	9	5.8	160	24.8	χ^2= 173.729*	<0.001*
Pervious I, II, III, IV	316	39.5	13	8.4	303	47.0		
Primigravida	315	39.4	133	85.8	182	28.2		

χ^2: Chi-Square test. **U:** Mann Whitney test. **t:** Student t-test. **FE:** fisher exact *significant at P≤0.05

Table 3: Distribution of laboring females who attend El-Shatby Maternity Hospital, Alexandria according to their age and clinical profile at time of delivery.

Clinical profile	Total (n=800)	<20 year (n=155)	≥20 years (n=645)	t	p
Blood pressure					

Blood pressure level	**No.**	**%**	**No.**	**%**	**No.**	**%**		
Normal	692	86.5	136	87.7	556	86.2	χ^2= 0.254	0.614
High	108	13.5	19	12.3	89	13.8		
BMI								
Mean ± SD.	26.84 ± 1.90		25.80 ± 1.94		27.09 ± 1.81		7.875*	<0.001*
Laboratory Findings								
Hb								
Mean ± SD.	10.90 ± 1.17		10.88 ± 1.14		10.90 ± 1.18		t= 0.168	0.866
WBCs								
Mean ± SD.	10.32 ± 3.70		10.89 ± 3.66		10.18 ± 3.70		U= 42971.0*	0.006*
Random Blood Sugar								
Mean ± SD.	97.25 ± 20.08		94.47 ± 16.63		97.92 ± 20.78		t= 1.923	0.055

Table 4: Distribution of laboring females who attend El-Shatby Maternity Hospital, Alexandria according to their age and Medical complications during delivery.

Medical complications#	**Total (n=800)**		**<20 year (n=155)**		**≥20 years (n=645)**		χ^2	**p**
	No.	**%**	**No.**	**%**	**No.**	**%**		
Absence of complications	348	43.5	67	43.2	281	43.6	0.006	0.939
Presence of complication	452	56.4	88	56.8	364	56.4		
Gestational HTN	38	4.8	3	1.9	35	5.4	3.366	0.067
Preeclampsia	65	8.1	16	10.3	49	7.6	1.244	0.265
Anemia	183	22.9	32	20.6	151	23.4	0.542	0.462
Thrombocytopenia	33	4.1	3	1.9	30	4.7	2.330	0.127
Gestational DM	13	1.6	1	0.6	12	1.9	1.155	FEp=0.481
UTI	215	26.9	54	34.8	161	25.0	6.204*	0.013*
DVT	2	0.3	0	0.0	2	0.3	0.482	FEp=1.000
Blood transfusion	26	3.3	4	2.6	22	3.4	0.274	0.601
ICU admission	7	0.9	3	1.9	4	0.6	2.493	FEp=0.137

#: Total number >800 due to patients having more than one complication.

Table 5: Distribution of laboring females who attend El-Shatby Maternity Hospital, Alexandria according to their age and obstetric complications during delivery.

Obstetric complications#	Total (n=800)		<20 year (n=155)		≥20 years (n=645)		χ^2	p
	No.	%	No.	%	No.	%		
Absence of complications	390	48.8	49	31.6	341	52.9	22.598*	0.001*
Presence of complications	410	51.2	106	68.4	304	47.1		
PTL	133	16.6%	40	25.8%	93	14.4%	11.692*	0.001*
PROM	239	29.9%	63	40.6%	176	27.3%	10.645*	0.001*
Meconium stained	13	1.6%	2	1.3%	11	1.7%	0.135	FEp=1.000
Oligohydramnios	105	13.1	32	20.6	73	11.3	9.535*	0.002*
Polyhydramnios	18	2.3	2	1.3	16	2.5	0.805	FEp=0.549
Chorioamnionitis	5	0.6	3	1.9	2	0.3	5.316	FEp=0.053
Antepartum Hg	44	5.5	10	6.5	34	5.3	0.335	0.563
Postpartum Hg	16	2.0	3	1.9	13	2.0	0.004	FEp=1.000
Antepartum fit	3	0.4	2	1.3	1	0.2	4.311	FEp=0.098
Postpartum fit	1	0.1	1	0.6	0	0.0	4.166	FEp=0.194
Postdated	16	2.0	4	2.6	12	1.9	0.331	FEp=0.528
Obstructed labor	1	0.1	0	0.0	1	0.2	0.241	FEp=1.000
Birth trauma	17	2.1	6	3.9	11	1.7	2.818	FEp=0.116

#: total number >800 due to patients having more than one complication.

Table 6: Distribution of laboring females who attend El-Shatby Maternity Hospital, Alexandria according to occurrence of abnormal fetal outcome.

Fetal outcome	Total (n=800)		<20 year (n=155)		≥20 years (n=645)		Test of sig.	p
	No.	%	No.	%	No.	%		
Fetal complication	313	39.1%	81	52.3%	232	36.0%	χ^2= 13.922*	<0.001*
IUGR	45	5.6	10	6.5	35	5.4	χ^2=0.247	0.619
IUFD	21	2.6	2	1.3	19	2.9	χ^2=1.340	0.247
Congenital anomaly	35	4.4	5	3.2	30	4.7	χ^2=0.607	0.436
Birth weight								

<2500 gm (low)	201	25.1	54	34.8	147	22.8	χ^2= 9.643*	0.009*
2500 – 4000 gm (normal)	581	72.6	98	63.2	483	74.9		
>4000 gm (macrosomia)	18	2.3	3	1.9	15	2.3		
Mean ± SD.	2703.3 ± 815.5		2504.7 ± 912.0		2751.1 ± 783.8		t= 3.099*	0.002*
Birth asphyxia	1	0.1	0	0.0	1	0.2	χ^2=0.241	FEp=1.000
APGAR score								
<7	285	35.6	73	47.1	212	32.9	χ^2= 11.032*	0.001*
≥7	515	64.4	82	52.9	433	67.1		
Mean ± SD.	6.48 ± 1.33		6.17 ± 1.46		6.55 ± 1.29		U= 42452.0*	0.002*
Hypoxia	261	32.6	68	43.9	193	29.9	χ^2= 11.061*	0.001*
Admission to NICU	205	25.6	57	36.8	148	22.9	χ^2= 12.539*	<0.001*
Neonatal mortality	37	4.6	10	6.5	27	4.2	χ^2=1.454	0.228
Fetal GA (wks.)								
<32 weeks	108	13.5	29	18.7	79	12.2		
32 - <34 weeks	60	7.5	15	9.7	45	7.0	6.408*	0.041*
≥34 weeks	632	79.0	111	71.6	521	80.8		
Mean ± SD.	35.05 ± 3.57		34.35 ± 3.92		35.21 ± 3.46		t=2.525*	0.021*

χ^2: Chi square test, FE: Fisher Exact *: Statistically significant at $p \leq 0.05$ IQR: Inter quartile range, SD: Standard deviation, t: Student t-test, U: Mann Whitney test.

Discussion

Adolescent pregnancy is an important public health issue because of its high association with negative maternal and foetal consequences. In this six-month study of 800 pregnant women, adolescent mothers made up nearly one-fifth (19.4%) of total deliveries. This number is similar to that reported in a hospital-based research in Upper Egypt (17%). (11) While direct comparisons should be interpreted with caution due to differences in study design and population denominators, the proportion observed in the current study appears to be higher than adolescent birth rates reported in high-income countries such as the United Kingdom and the United States. (12,13) Such diversity is likely due to disparities in socioeconomic status, cultural traditions, educational achievement, and access to reproductive health treatments. The comparatively high frequency of adolescent pregnancies in the current study could also be attributed to the hospital's function as a high-volume tertiary referral facility servicing densely populated governorates. (11)

Adolescent moms faced higher social and economic disadvantages compared to women over 20. Adolescents were much more likely to be illiterate, unemployed, and live in rural regions, which is consistent with earlier research identifying these variables as important predictors of adolescent pregnancy. (14-18) Lower educational attainment may contribute to early marriage and pregnancy by reducing health literacy and providing fewer educational and career options, whereas rural living

frequently reflects differences in socioeconomic development and access to reproductive and maternal healthcare services. (17,19-25) Collectively, these data highlight the impact of social determinants on adolescent pregnancy and the need for interventions that go beyond clinical treatment and encompass educational, economic, and community-based approaches.

A significant finding of the present study was that 85.8% of adolescent mothers are primigravida, compared to only 32.3% of adult mothers ($p < 0.001$). This trend suggests early pregnancies and reflects a lack of family planning awareness and reproductive health knowledge. Sociocultural norms promoting early marriage and childbearing also play a role. (26-28) Additionally, primigravidity is linked to increased obstetric complications such as hypertension as published in a study in India (2023) noting higher incidences of hypertensive disorders and labor-related issues among adolescent primigravidas in India, attributed to physiological immaturity and insufficient obstetric experience. (29)

Adolescent mothers had a significantly higher prevalence of urinary tract infections (34% vs. 25%), which is consistent with the findings of de Souza et al. (2021). This could be explained by the anatomical and physiological immaturity of the genital tract, as well as pregnancy-related hormonal changes that increase susceptibility to infection. (30-32) In contrast, the prevalence of anaemia was similar amongst teenage and adult women (20.6% vs. 23.4%), contrary to the higher rates reported by Sharmin et al. (2023). (33) This difference may be due to similar nutritional status and antenatal care utilisation between the two groups, as well as the impact of multiparity and cumulative nutritional depletion among older moms. (34-36) Although the observed differences did not reach statistical significance, the distribution of hypertensive disorders was consistent with trends reported in previous studies, with adolescent mothers showing a higher frequency of preeclampsia and adult mothers a higher frequency of pregnancy-induced hypertension. This pattern is in line with earlier research suggesting that adolescent pregnancy, particularly among primigravidas, is associated with an increased risk of preeclampsia, possibly owing to biological and vascular immaturity. (37) In contrast, the increased prevalence of pregnancy-induced hypertension among adult moms may be linked to age-related metabolic and vascular risk factors, such as the adult group's higher BMI, as mentioned by Bhattacharya et al. (2025). (29)

In the current study, maternal age less than 20 years was significantly associated with a higher prevalence of obstetric complications, including preterm labour and delivery (25.8% vs. 14.4%), premature rupture of membranes (PROM) (40.6% vs. 27.3%), and oligohydramnios (20.6% vs. 11.3%), when compared with adult mothers. These findings are congruent with those of Staniczek et al., who reported an elevated risk of unfavourable obstetric outcomes, particularly preterm labour and PROM, among adolescent mothers. (38) The reported consequences are most likely connected rather than distinct events. Biological immaturity, nutritional deficiencies, cervical vulnerability, and increased susceptibility to genitourinary infections may predispose adolescents to PROM, which can lead to ascending infection and preterm labour, creating a vicious cycle that raises the risk of adverse obstetric outcomes. [38-42]

Breech presentation was more common among adolescent moms (11.1% vs. 2.2%) and was a significant reason for caesarean delivery in the current study. This is congruent with Matasariu et al.'s findings, which showed a higher frequency of malpresentation among younger moms. (43) The higher prevalence of preterm delivery in teenagers may explain some of the increased frequency of breech presentation, as preterm foetuses are less likely to undergo spontaneous cephalic version due to their

smaller size and earlier gestational age. [43-45] In contrast, no significant differences were found in the rates of antepartum haemorrhage, postpartum haemorrhage, or birth trauma between the two groups, indicating that these complications are more strongly influenced by obstetric and intrapartum factors than maternal age alone, which is consistent with previous research. [46,47]

Previous caesarean section was the most common reason for caesarean delivery among adult women (56% vs. 34.8%), reflecting the well-established practice of repeat caesarean delivery in women with a prior caesarean birth due to concerns about uterine rupture and other complications associated with vaginal birth after caesarean (VBAC). (48) This outcome is predicted, given that older women are more likely to have had previous pregnancies and caesarean deliveries. [44] Adolescent moms, on the other hand, had a greater range of caesarean section grounds, such as breech presentation, severe preeclampsia, and premature rupture of membranes (PROM). This pattern is consistent with Maheshwari et al.'s review, which found that teenagers have a higher burden of these obstetric problems, increasing the likelihood of surgical delivery. [49]

The current study revealed that teenage pregnancy was linked to poor newborn outcomes, particularly low birth weight (LBW). In line with these findings, Ogawa et al. found that adolescent pregnancy increased the chance of preterm birth, LBW, and low Apgar scores, attributing these consequences to biological and nutritional immaturity, which may affect uteroplacental perfusion and foetal growth. [50, 51] In a 2020 multicenter study from Sub-Saharan Africa, infants born to adolescent mothers had a significantly higher risk of LBW (34.8% vs. 22.8%, $p < 0.001$). This increased risk was linked to maternal malnutrition, anaemia, and inadequate antenatal care. (46) Furthermore, Kassa et al.'s 2020 meta-analysis found that adolescent pregnancy was related with a 1.75-fold higher risk of LBW and a 1.55-fold higher risk of preterm birth, indicating the involvement of mother biological immaturity in poor foetal growth and early delivery. [37]

Prematurity was substantially more common among adolescent women, with 28.4% giving delivery before 34 weeks compared to 19% for older moms. This finding is consistent with a 2025 countrywide population-based study from Taiwan, which revealed adolescent pregnancy as an independent risk factor for preterm birth, most likely related to biological immaturity, higher susceptibility to infection, and poor socioeconomic conditions. [52] Infants born to adolescent mothers also had poorer initial neonatal adaption, as seen by considerably lower Apgar ratings, consistent with Rahman et al.'s findings, which they attributed to a higher prevalence of perinatal illness and inadequate antenatal care. [53] Adolescent women had considerably higher rates of neonatal intensive care unit (NICU) admission (36% vs. 22%, $p < 0.001$), possibly due to prematurity, low birth weight, and difficulties during labour. Mohammadian et al. observed similar findings, as did Chen et al. and Rahman et al., indicating a consistent link between adolescent pregnancy and poor infant outcomes across populations. (53-55)

The present study was conducted in a high-volume tertiary referral center serving a heterogeneous obstetric population, providing a comprehensive assessment of maternal and neonatal outcomes among adolescent pregnancies. However, as a single-center study, caution is warranted when generalizing the findings to other healthcare settings. Future multicenter prospective studies involving diverse populations and longer follow-up are recommended to validate these findings and further investigate the long-term consequences of adolescent pregnancy.

Conclusion

Adolescent pregnancy is considered prevalent among Egyptian women giving birth at Elshatby university hospital that is considered an important tertiary referral hospital serving both urban and rural populations of several governorates. Adolescent pregnancy is linked to a higher risk of negative obstetric and neonatal outcomes. The study results emphasise the necessity of all-inclusive initiatives targeted at avoiding adolescent pregnancy by increasing access to adolescent-friendly healthcare facilities, raising awareness of reproductive health issues, and empowering women. Maternal and newborn outcomes may be improved by boosting prenatal care and ensure that pregnancy-related problems among adolescent mothers are promptly anticipated, identified and managed.

Use of Artificial Intelligence

The authors used an artificial intelligence–assisted language tool solely to improve the clarity, grammar, and readability of the manuscript. The authors critically reviewed and edited all generated text, verified the accuracy of the scientific content and references, and take full responsibility for the final version of the manuscript.

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