



## Study of effect of maternal age on obstetric and neonatal outcome in primiparous women

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### Abstract

**Background:** Pregnancy at extremes of age can be very challenging. The reflex of a woman to pregnancy is influenced by various factors through which woman's age at pregnancy time can be known as the single most important factor that has undeniable effect on pregnancy process and labour. Both adolescent and elderly pregnancy are considered to be high risk as they have unique outcomes. There is a need for individualization of the antenatal surveillance programmes and obstetric care based on different age group in order to improve the outcomes. India, with its growing population needs to address this issue with all possible measures.

**Aims & Objectives:** Aim is to assess the effect of maternal age on obstetric and neonatal outcome.

Objective is

1) To assess the maternal outcome in terms of development of various co-morbidities like Gestational Hypertension, Pre-eclampsia, Eclampsia, Gestational diabetes, Oligohydraminos and Polyhydraminos, Anemia, Post-partum haemorrhage, Placenta previa, Abruptio placenta, etc., and to assess the mode of delivery.

2) To assess the neonatal outcome in terms of birth weight, maturity, Apgar score and NICU admisi

This prospective observational study was conducted on 500 primiparous women who attended the antenatal clinic at Department of Obstetrics & Gynaecology, ESIC-MC & PGIMSR Hospital, Rajajinagar, Bengaluru from January 2018-June 2019. A detailed history regarding maternal age, period of gestation, development of any signs and symptoms of various co-morbidities is taken and antenatal examination is done. Routine antenatal investigations were done and all the cases were followed till delivery. Development of various maternal co-morbidities, mode of delivery and neonatal outcome was assessed.

### Results

- Majority of our study population were in 20-34 years age group (72.2%), teenagers constituted 19.2%, advanced maternal age constituted 8.6%.
- Teenagers had 12.5% of preterm labour, 20-34 years of age group had 3.9% and elderly had 13.9% of preterm labour and is statistically significant ( $p < 0.05$ ).
- 12.5% of teenage mothers had pregnancy induced hypertension, 20-34 years of age group had 13.3% and older mothers had 39.4% of pregnancy induced hypertension. Eclampsia was seen only in teenagers (2.1%) and is statistically significant ( $p < 0.05$ ).
- Gestational diabetes was highest among older mothers (25.7%) compared to 20-34 years age group (7.8%) and younger mothers (2.1%) and is statistically significant ( $p < 0.05$ ).
- Vaginal delivery among teenagers was 47.9%, 20-34 years age group was 50.1% and older mothers was 30.2% which is statistically significant ( $p < 0.05$ ).
- LSCS was 52.1% in teenagers, most common indication being fetal distress (32.3%) followed by malpresentation (6.2%) and CPD (1%). Among older mothers, LSCS was (69.8%), most common indication being fetal distress (53.5%), followed by CPD (14%) and malpresentation (4.7%). This was statistically significant ( $p < 0.05$ ).
- Among NICU admissions, adolescents constituted 31.7%, 20 to 34 years age group constituted 53.3%, older age group 15%. NICU admissions among different age group is statistically significant ( $p < 0.05$ ).

**Conclusion:** Teenage and Elderly pregnancy are associated increased maternal and perinatal mortality and morbidity early detection of risk factors and prevention is necessary to reduce the morbidity

**Keywords:** Teenage, advanced maternal age, pregnancy, preterm labour, cesarean section, pre-eclampsia, gestational diabetes, hypothyroidism, Apgar score, NICU admission.

### Introduction

**Maternal Age:** Childbirth is one of the most awaited and cherished event in the life of a woman wherein she steps into a world of creation i.e. motherhood. The physiological transition from being pregnant to becoming a mother is an enormous emotional and physical accomplishment for the women and her family. Pregnancy and labour is an enigma and complications may arise at any stage that may threaten

the life of the mother and the fetus.

Maternal age is defined as the age of the mother in completed years at the time of delivery <sup>[1]</sup>. Reproductive age is the interval from the age of menarche to the chronologic age at conception <sup>[2]</sup> whereas gynecologic age is the time span from the age of menarche to the chronologic age at delivery <sup>[2]</sup>. With the improvement of socioeconomic conditions, the median age of menarche has shown a

downward trend. It ranges from 12.5 years in developed countries to more than 15 years in poorly developed countries [3].

Women at both ends of the reproductive-age spectrum have unique outcomes to be considered. Caring and management of such pregnancies can be challenging.

### Teenage Pregnancy

Teenage pregnancy continues to be a major social health issue both in developing and developed countries. During adolescence, the body is in a growing state and if pregnancy occurs during these years, the nutrition must suffice the growth of the mother in addition to the baby. The outcomes are hence influenced by this biological immaturity, unintended pregnancy, inadequate perinatal care, poor maternal nutrition and stress which can lead to increased maternal and fetal morbidity and mortality.

Teenage is characterized by rapid somatic changes of sexual and psychic maturation i.e. person is changing rapidly, physically as well as mentally. It is a time of rapid developmental change and emotional upheaval as teenagers strive to assert their autonomy.

Teenage pregnancy constitutes 11% of all births worldwide and 23% of disease burden due to pregnancy and labour due to lack of proper prenatal care.<sup>4</sup> The lowest teenage pregnancy rates is seen in Netherlands. In developed countries, the highest teenage pregnancy rates is seen in United States. In South Asia, early marriage is common and 25-35% of adolescent girls in Pakistan, Bangladesh, Nepal and India begin child bearing as early as 17 years.

India is the second most populous country in the world with total population of 1.37 billion (2019), adolescent (10-19 years) constitute 22%. Incidence of teenage pregnancy in India is 2 women out of every 1000 pregnancies

Young mothers have been shown to be exposed to an increased risk of anemia, low birth weight, fetal death, eclampsia and preterm birth although, at the same time, they were more likely to have a spontaneous normal vaginal birth due to pre-term birth and low birth weight. The risk of postpartum hemorrhage was significantly decreased. Majority of caesarean sections were due to cephalo pelvic disproportion.

### Advanced Maternal Age

In the past few decades, maternal age has increased worldwide. The fertility rate for women over the age of 35 years is growing fast in both developed and developing countries. Delayed childbearing has become socially acceptable, and childbearing at an older age is becoming more common. Various contributing factors for delay in childbirth include changes in societal values of acceptance of later commencement of childbearing, decreasing family size, late marriage, longer life expectancy, more effective contraception, equality in the workplace, increasing workforce participation, educational and career opportunities, modern and improved infertility treatment, and developments in obstetric care [6]. Women who delay their childbearing are more likely to value the importance of establishing independence through education, secure employment and financial stability than women who had their children earlier in life.

Pregnancies at AMA are associated with more complications and adverse outcomes than pregnancies at younger ages like increased risk of hypertension, diabetes

mellitus, subfertility, miscarriage, ectopic pregnancy, anemia, antepartum hemorrhage, malpresentation, postpartum hemorrhage, increased incidence of cesarean sections. Fetal and neonatal risk is also high due to increased incidence of chromosomal abnormalities (mainly Down's syndrome), multiple pregnancy, IUGR, prematurity leading to higher number of NICU admission.

Hence a study was necessary to conduct at ESIC Medical College and Post Graduate Institute of Medical Sciences, Rajajinagar, Bengaluru to analyze the outcome of pregnancy in adolescent and advanced maternal age compared to normal age population.

### Aims and Objectives

Aim is to assess the effect of maternal age on obstetric and neonatal outcome. Objective is:

1. To assess the maternal outcome in terms of development of various co-morbidities like Gestational Hypertension, Pre-eclampsia, Eclampsia, Gestational diabetes, Oligohydramnios and Polyhydramnios, Anemia, Post-partum haemorrhage, Placenta previa, Abruptio placenta, etc., and the mode of delivery.
2. To assess the neonatal outcome in terms of birth weight, maturity, Apgar score and NICU admission.

### Methodology

#### Source of data and materials

A prospective study was conducted on 500 primiparous women who attended antenatal clinic at ESIC-MC & PGIMSR Hospital, Bangalore from January 2018 - June 2019

#### Inclusion Criteria

1. Pregnant women who were willing to give written and informed consent.
2. All primiparous women in the age group 18 to 45 years were considered in this study.

#### Exclusion Criteria

1. Previous ectopic pregnancy.
2. Chronic cases of DM, HTN, Thyroid disorders and Epilepsy.

### Method of Collection of Data

**Duration of the study:** Eighteen months (January 2018 to June 2019)

**Type of study:** A Prospective Observational Study

All the primiparous women who attended the antenatal clinic were assessed from their first visit. A detailed history regarding maternal age, period of gestation, development of any signs and symptoms of various co-morbidities is taken and antenatal examination is done. Routine antenatal investigations were done which include CBC, HIV, HbsAg, VDRL, Blood grouping and typing, OGCT, TFT, Urine routine and USG-Obstetrics. Development of various maternal co-morbidities like Gestational Hypertension, Preeclampsia, Eclampsia, Gestational diabetes, Oligohydramnios and Polyhydramnios, Anemia, Post-partum haemorrhage, Placenta previa and Abruptio placenta are assessed; mode of delivery- normal vaginal delivery, instrumental delivery or caesarean section are noted. Neonatal outcomes in terms of Apgar score at 1 and 5 minutes and NICU admissions are assessed.

**Sample Size**

The sample size for the present study was calculated by considering 14% complication rate in primiparous women from the past published literature. The minimum sample size has been calculated to 410 cases with 0.03 as absolute marginal error at 5% level of significance assuming two tailed hypothesis. Therefore, enrolled 500 cases in our study. Following formula was used to calculate the sample size:

$$n = \frac{Z_{\alpha/2}^2 PQ}{D^2}$$

Where,  $Z_{\alpha/2} = 1.96$ ,  $P = .14$ ,  $Q = 1 - P$  and  $D = 0.03$

**Statistical Analysis**

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 21 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. Non-Parametric test like Kruskal Wallis test is used to measure p value for APGAR Score to

compare with two and more groups Graphical representation of data: MS Excel and MS word was used to obtain various types of graphs such as bar diagram, Pie diagram and Scatter plots. P value (Probability that the result is true) of  $< 0.05$  was considered as statistically significant after assuming all the rules of statistical tests.

**Results**

During the period January 2018-June 2019, 500 numbers of primiparous women giving birth at ESIC-MC & PGIMSR, Bangalore were studied. The obstetric and neonatal data subdivided into maternal age groups are presented in the form of tables and figures.

**Table 1:** Distribution of study subjects based on age group:

	Frequency	%
Age Group		
17 to 19 years	96	19.2%
20 to 34 Years	361	72.2%
≥35 Years	43	8.6%

In our study, maximum number of patients were between age group 20 to 34 years (72.2%), number of teenage mothers were 96 (19.2%), and elderly primi were 43 (8.6%).

**Table 2:** Distribution of study subjects based on gestational age among different age group

		Age Group					
		17 to 19 years		20 to 34 years		≥35 years	
		Frequency	%	Frequency	%	Frequency	%
Gestation in weeks	Less than 28 weeks	1	1.0%	1	0.3%	1	2.3%
	28 to 36 weeks	11	11.5%	13	3.6%	5	11.6%
	37 to 40 weeks	74	77.1%	300	83.1%	30	70.0%
	More than 40 weeks	10	10.4%	47	13%	7	16.27%

Chi square = 14.79 p= 0.005

In our study; number of deliveries less than 28 weeks were 1 each in age group 17 to 19 years (1%), 20 to 34 years (0.3%), and more than 35 years (2.3%). The number of pre-term births in gestational age between 28 to 36 weeks were similar in teenage mothers (11.4%) and elderly primi

(11.6%) where as in normal age group it was only 3.6%. Post term pregnancy were comparatively higher in elderly primi (16.27%) than teenagers (10.4%) Association of gestational age with maternal age is statistically significant (P < 0.05).

**Table 3:** Distribution of co-morbidities among study subjects based on age group

		Age-Group					
		17 to 19 years		20 to 34 Years		≥35 Years	
		Frequency	%	Frequency	%	Frequency	%
PIH	Absent	82	85.4%	313	86.7%	26	60.5%
	GHTN	8	8.3%	40	11.1%	15	34.9%
	Pre-Eclampsia	4	4.2%	8	2.2%	2	4.7%
	Eclampsia	2	2.1%	0	0.0%	0	0.0%
GDM	Nil	94	97.9%	333	92.2%	32	74.4%
	GDM-A2	0	0.0%	18	5.0%	8	18.7%
	GDM-A1	2	2.1%	10	2.8%	3	7.0%
Hypothyroid	Present	11	11.5%	67	18.6%	13	30.2%
	Absent	85	88.5%	294	81.4%	30	69.8%
Anemia	Present	4	4.2%	13	3.6%	2	4.7%
	Absent	92	95.8%	348	96.4%	41	95.3%

In our study 12.4% patients had Gestational Hypertension. In elderly primi group 32.6%, and in teenage mothers it was 8.3%. The percentage of pre-eclampsia in teenage mothers was 4.2% and 4.7% in elderly. Percentage of eclampsia in teenage mothers was 2.1%. No cases of eclampsia was seen in elderly. Association of Hypertension in pregnancy with maternal age is statistically significant (p < 0.05)

In our study, GDM was present in 8.2%; in teenage mothers 2.1% and in elderly mothers 25.7% Association of GDM with maternal age is statistically significant. In our study Hypothyroidism was 18.2%. In teenage 11.8% and in elderly mothers it is 30.2%. Association of Hypothyroid and maternal age is statistically significant (p < 0.05)

In our study anemia was seen in 4.2% of teenagers, 4.7% advanced maternal age, 3.6% in age group 20 to 34 years.

**Table 4:** Distribution of Mode of delivery among study subjects based on age group

		Age Group					
		17 to 19 years		20 to 34 years		≥35 years	
		Frequency	%	Frequency	%	Frequency	%
Mode of delivery	Vaginal Delivery	46	47.9%	181	50.1%	13	30.2%
	Cesarean delivery	50	52.1%	180	49.9%	30	69.8%

Chi square = 6.100 p= 0.047

In our study, 47.9% of teenage mothers delivered vaginally and 52.1% of them delivered by cesarean section. In age group 20 to 34 years, vaginal delivery was 50.1% and caesarean delivery was 49.9%. Whereas in elderly primis

the rate of cesarean delivery was 69.8% and vaginal delivery was 30.2%. Association of mode of delivery with maternal age is statistically significant (p<0.05)

**Table 5:** Distribution of Outcome of Baby among study subjects based on age group

		Age Group					
		17 to 19 years		20 to 34 years		≥35 years	
		Frequency	%	Frequency	%	Frequency	%
Baby Outcome	IUD	1	1%	3	0.83%	2	4.6%
	IUGR	7	7.29%	20	5.5%	6	13.9%
	PRETERM	13	13.5%	20	5.5%	5	11.6%
	TERM	75	78.1%	318	88%	30	69.7%

Chi square 18.411 p=0.005

In our study teenagers, term babies were 78.1%, pre-term babies were 13.5%, IUGR babies were 7.29% and IUD 1%. In advanced maternal age; term babies were 69.7%, pre-term were 11.6%, IUGR were 13.9% and IUD were 4.6%. Association of outcome of baby is statistically significant (p<0.05)

20 to 34 years of age. This is true as the optimal age group in India is between 20 and 30 years

**Table 6:** Distribution of NICU admissions among study subjects based on age group

		NICU			
		Admitted		Not Admitted	
		Frequency	%	Frequency	%
Age Group	17 to 19 years	19	31.7%	77	17.5%
	20 to 34 years	32	53.3%	329	74.8%
	≥35 years	9	15.0%	34	7.7%

Chi square =12.12 p=0.002

In our study the babies which got admitted in NICU were 31.7% in teenage mothers and in elderly is 15%. Association of NICU admission among teenage and advanced maternal age is statistically significant. (p<0.05)

**Discussion**

Pregnancy at extremes of age can be very challenging. The reflex of a woman to pregnancy is influenced by various factors, through which women's age at pregnancy time can be known as the most important factor that has undeniable effect on pregnancy process and labour [2].

Teenage pregnancy is recognized as a significant problem of public health. As more and more women postpone childbearing upto the age of 35 years the impact on maternal and perinatal outcomes becomes increasingly relevant. Prospective observational study was done on 500 primiparous women in the Department of Obstetrics and Gynecology at ESIC-MC & PGIMSR, Bangalore.

**Age**

In our study the youngest mother is 17 years old and the eldest is 42 years old. Majority of the patients belonged to

**Comparison of maternal age distribution with other studies**

Teenage pregnant women in our study were 19.2% comparable with Talukdar *et al* [7] who reported 14.2% and Bakwa-Kanyagi F *et al* [11] who reported 17.7% of adolescent mothers. Yasmin *et al* [9] and Rashmi, *et al* [10] reported lower rates of teenage pregnancy (5.1% and 5.5%). This difference might be due to population age difference, socio-economic status, level of education, age at marriage and contraception awareness. Also due to the fact that not all teenagers attend hospital for delivery. All of the teenage mothers in our study were married.

Elderly mothers in our study were 8.6%. Other studies reported lower incidence of advanced maternal age women; Talukdar [7], 2.6%, Ojule, *et al* [14] 4.7%. Pegu *et al* [13] reported higher incidence of 17.8%. Effective birth control, advances in assisted reproductive technology, delayed marriage, increasing rates of divorce and remarriage, and women's pursuit of higher education and career advancement all contribute to increasing trend of pregnancy at advanced age.

**1. Abortions**

**Comparison of previous abortions with other studies based on age group**

The percentage of teenage pregnant women who underwent miscarriage in our study was 6.25%; Yasmin [9], reported higher abortion rates in teenagers, 85.24%.

In elderly mothers, 58.1% had miscarriage in our study population which is comparable with Cleary-Goldman *et al* [16] 39.5%. Bayrampur H, *et al* [6], and Rajput *et al* [17] reported lower incidence; 22.6% and 10% respectively. The increased incidence of abortion in this age group can be secondary to chromosomally or structurally anomalous fetus. Association of abortions with maternal age is statistically significant (p<0.05).

## 2. Anemia

### Comparison of anemia with other studies based on age group

In our study, anemia in teenage mothers was 4.2%. In other studies, incidence being as high as 79.2% reported by Rita D *et al*<sup>[18]</sup> and 70% by J Bindal *et al*<sup>[19]</sup>. This may be due to poor nutrition in young women.

In our study population anemia was 4.7% in elderly mothers, similar to Rajput N *et al*<sup>[17]</sup> study of 4.86%.

## 4. Pre-Eclampsia

### Comparison of pre-eclampsia with other studies based on age group

In our study, teenagers who developed pre-eclampsia were 4.2% which is almost twice the incidence in the age group 20 to 34 years (2.2%). In other studies; Verma V *et al*<sup>[20]</sup>, it is 18.8%; Bloomberg *et al*<sup>[23]</sup> it is 1.85%. The increased incidence of pregnancy-induced hypertension is largely explained by nulliparity<sup>[21]</sup> Proposed physiology for pre-eclampsia in adolescent mothers is that legitimate menstrual preconditioning among adolescent mothers is absent, which interfere with the procedure of decidualization and trophoblastic intrusion that increases the risk of defective deep placentation<sup>[25]</sup>.

In advanced maternal age, pre-eclampsia was 4.7% comparable with teenage group (4.2%). Talukdar *et al*<sup>[7]</sup> reported 7.6% incidence of pre-eclampsia in advanced age. Bloomberg *et al*<sup>[23]</sup> and Kahveci *et al*<sup>[24]</sup>, 2.95% and 8.45% respectively.

- There is reduced nitric oxide bioavailability that can lead to altered endothelium function and loss of cardiovascular compliance, and results in constriction in uterine and systemic circulation. In addition, the invading capacity of the trophoblast cells into the underlying decidua is constrained because of impairment of decidua reaction as well as changes in microvillus architecture. Furthermore, ischemic placenta could trigger more oxidative stress reaction, thus lead to increased syncytiotrophoblast apoptosis and more immunological responses which lead to higher risks of pregnancy induced hypertension.<sup>26</sup>
- As pregnancy progresses, maternal adaptation resulting in high flow, lower resistance circulation and decrease in mean blood pressure which is impaired in older women leading to development of pre eclampsia. The failure of uterine vasculature to adapt to the increased hemodynamic demands of pregnancy as women age can be a proposed explanation<sup>[18]</sup>.
- Other factors include maternal neuroendocrine and inflammatory processes.
- Risk factors for pre-eclampsia in advanced maternal age include overweight or obesity. The existing oxidative damage reaction gets worsen in elderly mothers with high BMI in high socio-economic status.
- Low socioeconomic status and low education level aggravates both early onset and severe type of pre-eclampsia in rural areas.

Association of pregnancy induced hypertension with maternal age is statistically significant ( $p < 0.05$ ).

## 5. Eclampsia

### Comparison of eclampsia with other studies based on age group

In our study, eclampsia in teenagers was 2.1%, which was similar to Kamini S *et al*<sup>[27]</sup> (2%). Talukdar *et al*<sup>[7]</sup> reported 5.6% of eclampsia in teenagers. Inadequate antenatal care in teenagers places adolescent mothers at high risk of development of eclampsia. A report by the National Centre for Health Statistics in the USA showed an increasing trend in the frequency of eclampsia with descending age group (0.6% in 10 to 14 years old; 0.35% among 25 to 29 years old).

There were no eclampsia cases in other age groups in present study. There were no reported cases of eclampsia in elderly primi in other case studies either.

## 6. Gestational Diabetes Mellitus

### Comparison of GDM with other studies based on age group:

In our study Gestational Diabetes was 27.7% in older mothers. Kahveci *et al*<sup>[24]</sup> reported 15.75% of GDM in elderly.

It is believed that with aging there is reduction in the function of  $\beta$  cells and insulin sensitivity of cells and more dysfunctional lipid profile metabolism leading to development of diabetes<sup>[28]</sup>.

This is worsened by increasing BMI in advanced maternal age<sup>[28]</sup>.

The function and structure of haemoglobin and the means of glaciations is changed with the increase in age, could lead to development of gestational diabetes<sup>[29]</sup>.

Association of gestational diabetes with maternal age is statistically significant ( $p < 0.05$ )

## 7. Preterm Labour

### Comparison of preterm labour with other studies based on age group

In our study, preterm labour in teenagers was 12.5%, correlating with Kamini S *et al*<sup>[27]</sup> (12%) and Shruthi A *et al*<sup>[25]</sup> (18.6%). Various other studies also found out that adolescent pregnancy are at increased dangers of preterm birth.

It could be due to the fact that the uterine and cervical blood supply in adolescent mothers is immature which can lead to prostaglandin secretion and prompt preterm labour.<sup>25</sup>

Immature uterine circulation in younger women may predispose to subclinical genital infection, and hence preterm labour.

Two general features of this biological immaturity could have a role: a young gynaecological age (defined as conception within two years of menarche) and the effect of the girl becoming pregnant before her own growth has stopped, thus competing with the developing fetus for nutrients and adding to this detriment. Other main cause for pre-maturity and LBW are poor nutritional status, pre-eclampsia, anemia.

Preterm delivey in advanced maternal age in our study was 13.9%; Aghamohammadi *et al*<sup>[29]</sup> reported 21.2%, and Rajput N *et al*<sup>[11]</sup> reported 6.25%. It is found that iatrogenic cause associated with advanced maternal age like chronic HTN, DM, Antepartum hemorrhage increase the incidence of preterm delivery. Malpresentation and multiple pregnancy also contribute to this.

Association of gestational age at delivery with maternal age is statistically significant ( $p < 0.05$ )

## 8. Vaginal Delivery

### Comparison of vaginal delivery with other studies based on age group

In present study, teenagers who delivered vaginally were 47.9% comparable to Tabassum *et al* [12] (63.7%). Other studies reported higher rates of vaginal delivery among adolescents; Yasmin *et al* [9] 88.3%; Verma *et al* [20] 82.5%.

- Teenagers have likelihood of having spontaneous onset of labour and of having a normal vaginal delivery due to small babies.
- Also pelvic structure and musculature of teenagers encourage vaginal delivery.
- Previous studies proposed that a young gynaecological age is involved in prematurity process, thus promoting pre-term spontaneous deliveries.
- Finally, low socio-economic status, is associated with the risk of premature delivery in adolescent mothers.
- In our study older mothers who delivered vaginally were 30%; Kahveci *et al* [24] reported 53.8%.
- In advancing age labour becomes difficult due to rigid perineum and less reserve power of uterine contractions due to reduced number of oxytocin receptors.
- Endothelial dysfunction and impaired uterine contractions in advancing age can lead to inadequate uterine and utero-placental function.
- Association of mode of delivery with maternal age is statistically significant ( $p < 0.05$ ).

## Instrumental Deliveries

### Comparison of instrumental deliveries with other studies based on age group:

In our study there is 5.2% of instrumental deliveries in adolescent mothers; Kamini S *et al* [27] reported 9% of instrumental deliveries among teenagers due to poor maternal bearing down efforts. There are no reported cases of instrumental deliveries in elderly women in our study and other studies as well. It is seen that obstetricians tend to worry more about the older mothers and hence instrumental deliveries are avoided.

## 10. LSCS

### Comparison of LSCS rates with other study groups

LSCS in teenagers accounted for 52.1% in our study, which is similar to Rita D *et al* [8] reporting 42%, Kamini *et al* [27] 25% and Rashmi, *et al* [10] 24%. Main indications of LSCS in teenagers include fetal distress (32.3%) followed by malpresentation (6.2%) and CPD (1%).

LSCS rates in advanced age is higher in our study, being 69.8%. Kahveci, *et al* [24] reported 46.15%. Most common indication in older mothers being Fetal distress (53.5%), followed by CPD (14%) and malpresentation (4.7%).

- Because of presence of high-risk factors due to increased incidence of medical disorders and the labour abnormalities, there is a high risk of caesarean rate in the elderly age group.
- The other following characters also contribute: a lower clinical threshold for intervention among women of AMA, higher socio-economic status, conception by ART, advancing age of father and medico-legal concerns.

## 11. Post-Partum Hemorrhage

## Comparison of PPH with other studies based on age group

In our study, PPH among teenagers was 9.3%; Rashmi, *et al* [10] reported 3.5%. PPH among older mothers in our study was 13.9%, comparable to Rajput N *et al* [17], which reported 9%. Due to poor myometrial function, there is atonicity leading to post-partum hemorrhage.

## Perinatal Morbidity and Mortality

### 12. Low Birth Weight

#### Comparison of LBW with other studies based on age group

- Present study shows higher incidence of low birth weight in teenage mothers (24.6%), and comparatively less incidence in advanced maternal age (7%). The incidence of LBW in teenage mothers in Verma *et al* [20] and Yasmin *et al* [9] study were 35% and 16.86% respectively.
- Babies born to teenage mothers are more likely to be born preterm and hence are low birth weight.
- Few explanations proposed for such adverse outcome include biological immaturity which could lead to preterm birth, itself is an inherent risk factor for poor outcome and even adequate prenatal care does not completely eliminate this risk.
- Association of baby outcome with maternal age is statistically significant ( $p < 0.05$ ).

## 13. NICU Admission

### Comparison of NICU admissions with other studies based on age group:

In our study, NICU admission in teenage mothers was 31.7%. Yasmin *et al* [9] reported 4.9%, Rita D *et al* [8] 8.4%. Increased risk of pre-term birth and LBW in adolescent mothers is responsible for a higher admission rate to neonatal intensive care unit.

In older mothers the babies admitted to NICU were 15% correlating with Rajput N *et al* [17] 13.19%. Kahveci *et al* [24] reported higher rates of NICU admission, 53%. Lower educational levels and residence are very potent influencing factors for perinatal outcome. AMA has also been identified as a determinant for several adverse neonatal outcome including LBW, SGA, and preterm birth. These may be contributed by medical disorders also. All can lead to increased NICU admission.

Association of NICU admissions with maternal age is statistically significant ( $p < 0.05$ ).

## Conclusion

- Teenage pregnancy is an essential public health issue as it is associated with poor maternal and fetal outcome. Hence, emphasis is to be made on proper sexual education, delay child marriage, awareness and accessibility of contraception, skilled antenatal, childbirth and neonatal care, comprehensive abortion services to be given whenever required, all these can cause prevention and early detection of risk factors and decrease maternal and fetal morbidity and mortality.
- Advanced maternal age has positive impact on pregnancy outcome due to high socio-economic status and planned pregnancy, but they are more likely to have chronic medical conditions which can have an adverse outcome in pregnancy. Therefore elderly mothers should be offered prenatal screening and prenatal

diagnosis, targeted anomaly scan, liberalization of antepartum services to ensure safe motherhood and healthy fetus. Elderly mothers should receive ante-natal care in tertiary health centers to minimize maternal and fetal morbidity and mortality.

- Hence, individualization of antenatal surveillance based on age groups is necessary to improve the outcome.

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