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A Prospective Observational and Comparative Study on Social Determinants and Fetomaternal Outcome Between Teenage Primigravida and Adult Primigravida at Government Headquarters Hospital Cuddalore

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Abstract
Pregnancy complications and unsafe abortions are the leading causes of death among the adolescent girls. Teenage pregnancies are strongly impacted by factors such as low socioeconomic level, poor education and family type. In order to compare the mother and fetal outcomes of teenage primigravida with those of adult primigravida, our study aims to identify the societal factors that contribute to teenage pregnancy. This study was a Prospective observational and comparative study conducted among the Antenatal mothers who attended the outpatient and inpatient in the Department of Obstetrics and Gynaecology, Government District Head Quarters Hospital, Cuddalore who satisfied the inclusion and exclusion criteria were enrolled. The maternal and fetal outcomes, education level, and socioeconomic variables were collected and analyzed. This study was carried out among 360 antenatal women, categorized as Teenage and Adult Primigravida based on the age group($p<0.001$). The education status of the antenatal mothers in the Teenage Primigravida group was comparatively less when compared to the Adult Primigravida group($p=0.005$). The married teenage primigravida group had more frequent antenatal visits than married adult primigravida group($p<0.007$). The Antenatal complications were 1.75 times more common in Teenage Primigravida group than Adult Primigravida group. Teenage Primigravida group had 1.625 times higher prevalence of LBW compared to Adult Primigravida group($p<0.001$). According to our study, the major factors that contribute to teenage pregnancy include consanguinity, joint family structure, low socioeconomic position, early age at marriage, inadequate education, and ignorance about contraception. Teenage primigravida had a greater rate of vaginal delivery than adult primigravida and the major maternal problems were maternal anemia, hypertensive disorders of pregnancy, and premature labor.

INTRODUCTION

The period of physical and mental development between childhood and adulthood is known as adolescence. It is a period of remarkable structural, functional, and psychosocial growth. Since the adolescent has not yet reached her full growth potential, pregnancy during this time has a significant effect on her health. Adolescent pregnancies also have an impact on the country's economic and social development. According to the NFHS- 5[1] 6.8 % of 15-19 years old adolescent girls were already mothers or pregnant at the time of survey. Although the incidence of marriage at an early age is declining, adolescent fertility rate in India is 43/1000, which is much higher in rural area - 49/1000 when compared with urban area -27/1000. Factors like Poor Education, Low Socio-economic status, Type of the family, Lack of knowledge on Contraception and Safe sexual practices have a strong impact on teenage pregnancies.

Pregnancy during adolescent years has an adverse birth outcome. The adolescent girls are mostly undernourished with Low BMI and 59.1% of them are already anaemic. Less caloric intake and increased demand of iron during pregnancy leads to Maternal Anaemia and need for correction with iron preparations and blood transfusions. Also, increased incidence of maternal malnutrition, low BMI, poor weight gain during pregnancy, anaemia and HDP results in LBW babies. Teenage pregnancy has an increased risk of obstetrical complications such as Preterm Labour, Prelabour rupture of membranes, Gestational Hypertension, Non-Severe to Severe Pre-eclampsia, Eclampsia, Malpresentation of the foetus, Dystocia of labour, Postpartum Haemorrhage, Postdated pregnancy, all of which results in an increased risk of Perinatal Mortality. The fifth annual report of State of the World's Mothers stated that adolescent girls aged 15-19 years are twice as likely to die out of pregnancy related complications when compared with women aged 20 years and above.

Adolescent pregnancy has an increased incidence of preterm deliveries, resulting in increased number of LBW babies and neonatal complications like respiratory distress syndrome, neonatal jaundice and infections. This in turn contributes to increased risk of neonatal mortality and morbidity. LBW will have an adverse impact on the newborn resulting in growth retardation. If the newborn happens to be a girl, it will result in a malnourished female, with a vicious cycle of female malnourishment all through the adolescence and adulthood. This culminates as intergenerational transmission of small mothers having small babies.

In this study, the outcome of teenage pregnancy and its association with social factors are studied. The study was done as there was comparatively less demonstrated evidence on the fetomaternal outcome of teenage pregnancy in the current scenario in the vicinity of population under study. Hence the aim of our study is to determine the social factors contributing to teenage pregnancy and to evaluate the maternal and fetal outcome of Teenage Primigravida in comparison with Adult Primigravida.

Objectives: The primary objective of our study is to identify the social determinants of teenage pregnancy and the strategies for its prevention. The secondary objective of our study is to compare the incidence of medical and obstetrical complications in Teenage Primigravida in comparison with Adult Primigravida and to compare the incidence of the fetal outcome in terms of Low birth weight and Preterm babies in Teenage Primigravida in comparison with Adult Primigravida.

MATERIALS AND METHODS

Study Type: Prospective observational and comparative study

Study Area and Study Duration: This study was conducted among the Antenatal mothers who attended the outpatient and inpatient in the Department of Obstetrics and Gynaecology, Government District Head Quarters Hospital, Cuddalore, Tamil Nadu from Jan 2021 to Dec 2021.

Sample Size and Calculation: The sample size of our study was 360 (180 Teenage Primigravida+ 180 Adult Primigravida). Considering the proportion of LBW babies among teenage pregnancy and adult pregnancy as 31.74% & 16.6% respectively as stated by Dutta Indranil et al[2], with alpha error as 5% and power as 80%, the sample size was calculated using the formula for hypothesis testing for difference between proportions and was found to be minimum 125 per group. By adding 20% non-response rate, the final sample size required would be minimum 157 per group and finally we decided to take 180 samples per group.

Inclusion Criteria:

Study Group:	Control Group:
Age group of 15- 19 years Primigravida	Age group of 20-25 years Primigravida
Gestational age of 28- 42 weeks	Gestational age of 28- 42 weeks
Singleton Pregnancy	Singleton Pregnancy

Exclusion Criteria: Cases of Multiple pregnancies, Congenital anomalies/IUFD and pre-existing chronic medical disorders were excluded from the study.

Data Collection Procedure: After Institutional Ethical Committee approval (R.NO.14416/P&D 2017 dated 9.12.2020), in the study group, consecutive enrolment of teenage pregnant women who met the inclusion

and exclusion criteria were taken into study until the target sample was achieved. In the control group, Adult Primigravida, immediately following the admission of Teenage Primigravida, fulfilling the above criteria was taken. Antenatal mothers were informed regarding the study and written informed consent was obtained. The social determinants, education status, maternal and fetal outcomes were collected and analysed.

Statistical Analysis: The data was entered in MS Excel and analysis was done using SPSS version 20. Shapiro Wilk test was used to assess the normality of the data and frequency and percentage was used to represent the categorical data. Chi-square test / Fisher exact test was used to find the association between the categorical data and Student's unpaired 't' test was used to find the association between the quantitative data, if data followed normality. Mann Whitney U test was used to find the association between the quantitative data, if data followed non normal distribution and appropriate graphs like bar charts, pie charts and box plots were used to represent the data. p value <0.05 was considered as statistically significant.

RESULTS AND DISCUSSIONS

This study was carried out among 360 antenatal women, categorized as Teenage and Adult Primigravida based on the age group, who attended the outpatient and inpatient wards of Department of Obstetrics and Gynaecology of Government Headquarters Hospital, Cuddalore. Since the data did not follow normal distribution (Shapiro Wilk test <0.05), median and inter-quartile range was considered and Mann Whitney U test was applied. In this study, the mean age of the study participants was 18.62 years in Teenage Primigravida group and 22.35 years in Adult Primigravida group. Majority of the teenage mothers belong to 18-19 years of age. There was a statistically significant difference between the two groups with respect to age (Table 1).

Mothers who had no formal education were more in the Teenage Primigravida group, while attainment of higher level of education was more in the Adult Primigravida group. There was a statistically significant difference between the two groups. The education status of the antenatal mothers in the Teenage Primigravida group was comparatively less when compared to the Adult Primigravida group (Table 2).

The prevalence of Odds ratio: 1.446; 95% Confidence interval: 0.905, 2.311 Prevalence ratio: 1.212; 95% Confidence interval: 0.939, 1.564. There was no statistically significant difference between the two groups. Teenage Primigravida group were 1.212 times more likely to be from Rural area than from Urban area (Fig 1 and Fig 2).

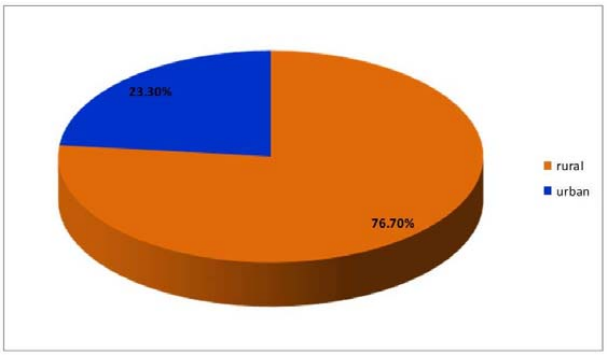

Fig. 1: Distribution of area among Teenage Primigravida

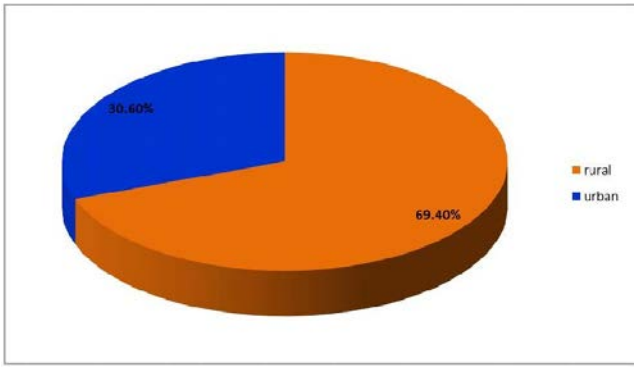

Fig 2: Distribution of area among Adult Primigravida

The proportion of teenage mothers from the Lower Middle Class were higher than the Adult Primigravida and there was a statistically significant difference between the two groups(Table 3).

The married teenage primigravida group had more frequent antenatal visits than married adult primigravida group. This is attributed to the fact that the health system in the State is more sensitive to High-Risk Pregnancy (Teenage Pregnancy). Since the data did not follow normal distribution (Shapiro Wilk test <0.05), median and inter-quartile range was considered and Mann Whitney U test was applied. There was a statistically significant difference between the two groups (Table 4).

The Antenatal complications were 1.75 times more common in Teenage Primigravida group than Adult Primigravida group and there was a statistically significant difference between the two groups. The Prevalence Odds ratio was 2.792 with 95% Confidence interval: 1.77, 4.44. The Prevalence ratio was 1.75 with 95% Confidence interval: 1.33, 2.30 (Table 5).

63.3% of Teenage Primigravida group had Normal delivery when compared to Adult Primigravida group with 57.2%. Operative vaginal delivery was also more common in Teenage Primigravida group (3.4%) than Adult Primigravida group (1.1%). There was no

statistically significant difference between the two groups. The most common cause for LSCS in the Teenage Primigravida group is Fetal distress followed by CPD in labour. Cephalopelvic disproportion was more common in the Adult Primigravida group (Table 6).

There was a statistically significant difference between the Teenage Primigravida and Adult Primigravida with respect to LBW. Teenage Primigravida group had 1.625 times higher prevalence of LBW compared to Adult Primigravida group (Table 7).

The proportion of very preterm babies are distributed equally in both the groups Moderate and Late preterm babies are higher in the Teenage Primigravida group (Table 8).

This prospective observational and comparative study was conducted to identify the social determinants of teenage pregnancy and its associated fetomaternal complications in comparison with Adult Primigravida gravida in our hospital. Based on the Social Determinants, the mean age of the Teenage Primigravida in this study group was 18.62 +/-0.63years and that of Adult Primigravida is 22.35 +/-1.8 years. Most of the teenage pregnancies happened between the age of 18-19 yrs. In a study by Mukhopadhyay P *et al*[3] the 81% of teenage mothers and 96.6%in a study by Naik RR *et al*[4] belonged to the age group of 18 19 years.

In our study 8.3% of the Teenage Primigravida and 1.7% of the Adult Primigravida had never received any formal education. And those mothers who had studied Higher class and above are 36.1% in adolescent group. The prevalence of those studies higher class and above in teenage mothers by Naik RR *et al*[4] in Goa is 23.7%, Ababio MO *et al*[4] in Ghana is 20%. This was in contrast to a study by Doddhihal C *et al*[6] where the 53.5% of teenage mothers had studied Higher Class and above. But, in a study by Zahirrudin *et al*[7] 70.4% of adolescent mothers were uneducated.

The prevalence of Teenage Primigravida in rural area was 76.7% and that of Adult Primigravida was 69.4% in our study. Teenage pregnancies are 1.212 times more likely to be from rural background. Similarly, Seneesh KV *et al*[8] showed 74.3% rural prevalence and Naik RR *et al*[4] showed 64% of the rural prevalence in the Teenage mothers. 62.2 % of teenage pregnancies and 50.6% in Adult Primigravida group occurred in joint family type. Teenage Primigravida are 1.274 times more likely to come from joint family compared to Adult Primigravida. This was close to Naik RR et al [4] study that had a distribution of 60% of joint family in the adolescent mother's vs 46 % in the adult mothers. Doddhihal C *et al*[6] shows 76.4%, Mukhopadhyay *et al*[3] shows 78%, Konduru et al[8] shows 72% of teenage pregnancies were associated with joint family.

Low socioeconomic status has an adverse outcome in teenage pregnancy. The prevalence of Low SES (< Class III) was 23.9% in Teenage Primigravida and 7.2% in Adult Primigravida. Fulpagare PH *et al*[10] showed that teenage mothers who had lower SES (< class III) was 34%, whereas it was 63.2 % in a study by Doddhihal C *et al*[6]. The comparatively better Socio-economic status in our group may be due to better education and improved standard of living. Hidalgo *et al*[11] stated in his study that Adolescent pregnancy in lower socio-economic status was at risk of delivering low birth weight babies. In our study, 43 teenage mothers belonging to Class -IV SES, delivered - 16 LBW babies and 7 preterm babies.

In our study, teenage mothers had more frequent AN visit than the adult mothers. This is also confirmed by a recent study by Fulpagare PH *et al* [10] in 3 states of Northern India, evaluating the SWABIMAAN programme among adolescent mothers and found that adolescent mothers had increased utilization of AN services compared with the other age groups. Also, study by Pathak P *et al*[12] showed 93.65% of mothers in Adolescent group and 100% mothers from adult group had adequate antenatal visits. The more frequent AN visits by teenage mothers in our study implies that adequate follow up of High risk adolescent mothers are ensured by the Health system.

Based on the Maternal Complications, the various complications studied, Teenage Primigravida group was 1.75 times more likely of developing complications than Adult Primigravida group. In our study, 77.78 % of teenage pregnancies were complicated. Baloch S *et al*[13] also showed that 88.46% of teenage pregnancies had antepartum complications. Most common maternal antepartum complications being Anaemia, HDP and Preterm labour.

The prevalence of Anaemia was 22.22% in Teenage Primigravida and 13.3% in Adult Primigravida. Of those anaemics, 12.2 % of Teenage Primigravida and 8.8% of the Adult Primigravida required Iron sucrose and 4.4% of the adolescent mothers and 2.2% of the adult mothers required Blood transfusion for Anaemia correction. The prevalence of Anaemia in our study, was in line with a study by Divya NV *et al*[14] - 20%, Devi PP *et al*[15]-22.6%, Pathak P *et al*[12]-28.7%.

The prevalence of Hypertensive disorders of pregnancy in Teenage Primigravida was 11.11% and Adult Primigravida was 4.44%. Teenage primigravida were 1.482 times at risk of developing HDP compared to Adult Primigravida. The incidence of Pre-eclampsia was 9% in Devi OS *et al*[16] study in 2018. While, Devi G *et al*[17] in 2018, shows higher rate of GHTN- 23.1%. This difference is due to the fact that higher mean age of

Table 1: Distribution of age (years) of the study participants

Group	N	Mean	Std. Deviation	Median	Inter-quartile Range	p value
Teenage Primigravida	180	18.62	0.637	19.00	1.0	
Adult Primigravida	180	22.35	1.869	22.00	3.0	<0.001
Total	360	20.48	2.332	19.50	3.0	

Table 2: Distribution of Education status of the study participants

S.No	Education status of the mother	Group				Total	
		Teenage Primigravida		**Adult Primigravida**			
		N	%	N	%	N	%
1	DEGREE	18	10.0	41	22.8	59	16.4
2	DIPLOMA	15	8.3	18	10.0	33	9.2
3	HSS	32	17.8	29	16.1	61	16.9
4	HIGH	37	20.6	35	19.4	72	20.0
5	MIDDLE	41	22.8	32	17.8	73	20.3
6	PRIMARY	22	12.2	22	12.2	44	12.2
7	ILLITERATE	15	8.3	31.7	18	5.0	
	Total	180	100.0	180	100.0	360	100.0
				%		%	

Chi-square test; Test statistic=18.552; p value=0.005; Degree of freedom=6

Table 3: Distribution of socio-economic status of the study participants

S.No	Socio Economic status	Group		Total
		Teenage Primigravida	Adult Primigravida	
1	LOWER MIDDLE	43 (23.9%)	13 (7.2%)	56 (15.6%)
2	MIDDLE	92 (51.1%)	79 (43.9%)	171 (47.5%)
3	UPPER MIDDLE	45 (25.0%)	88 (48.9%)	133 (36.9%)
	Total	180 (100.0%)	180 (100.0%)	360 (100.0%)

Chi-square test; Test statistic=30.962; p value<0.001; Degree of freedom=2

Table 4: Distribution of No. of AN visits of the study participants

No. of AN visits	N	Mean	Std.Deviation	Median	Inter-quartile Range	p value
Teenage Primigravida	176*	7.65	2.138	8.00	3.0	
Adult Primigravida	180	7.02	1.643	7.00	2.0	0.007
Total	356	7.38	1.974	7.00	2.0	

**unmarried mothers (4)*

Table 5: Distribution of Antenatal Complications among the study participants

S.No.	Complications	Group			
		Teenage Primigravida		Adult Primigravida	
		N	%	N	%
1	Anaemia	40	22.22%	24	13.33%
2	GHTN	12	6.67%	6	3.33%
3	Severe Pre-eclampsia	7	3.89%	2	1.11%
4	AP eclampsia	1	0.56%	0	0.00%
6	PROM	18	10.00%	13	7.22%
7	Oligohydramnios	9	5.00%	10	5.56%
8	Polyhydramnios	0	0.00%	2	1.11%
9	Breech	6	3.33%	3	1.67%
10	Pre-term	14	7.78%	8	4.44%
11	Post-term	9	5.00%	14	7.78%
12	Short stature	20	11.11%	17	9.44%
13	Seizure disorder	0	0.00%	1	0.56%
14	PPH	1	0.56%	0	0.00%

Table 6: Distribution of Indications for LSCS among the study participants

S.No	Indications for LSCS	Group			
		Teenage Primigravida		Adult Primigravida	
		N	%	N	%
1	CPD in labour	14	7.8%	26	14.4%
2	Fetal distress	16	8.9%	20	11.1%
3	Failed induction	6	3.3%	6	3.3%
4	Failure to progress	4	2.2%	3	1.7%
5	FGR	3	1.7%	3	1.7%
6	MSL	10	5.6%	9	5.0%
7	Breech	5	2.8%	2	1.1%
8	ROP	1	0.6%	2	1.1%
9	Cord prolapse	0	0.0%	1	0.6%
10	Severe pre-eclampsia with unfavourable cx	0	0.0%	1	0.6%
11	Fibroid complicated	0	0.0%	1	0.6%

**Fisher Exact test; Chi-square test*

Table 7: Distribution of LBW among the study participants

S.No	LBW	Group		Total
		Teenage Primigravida	Adult Primigravida	
1	Present	52 (28.89%)	20 (11.11%)	72 (20.00%)
2	Absent	128 (71.11%)	160 (88.89%)	288 (80.00%)
	Total	180 (100.0%)	180 (100.0%)	360 (100.0%)

Chi-square Test; p value<0.001

Table 8: Distribution pattern of Neonatal Complications in Preterm babies among the study participants

S.No	Pre-term	Group		Total
		Teenage Primigravida	Adult Primigravida	
1	28-32 wks	1 (0.6%)	1 (0.6%)	2 (0.6%)
2	33-34 wks	5 (2.8%)	1 (0.6%)	6 (1.7%)
3	34-36+6 wks	13 (7.2%)	7 (3.3%)	14 (3.9%)

Chi-square test; Test statistic=3.873; p value=0.049; Degree of freedom=1

our study group and early detection of at-risk women and treatment.

In our study, 7.78% of teenage mothers had preterm delivery compared with 4.44% in Adult Primigravida. In a study by Madala VR *et al*[18], 11.2% of teenage mothers had preterm delivery. Few other studies by Rita D *et al*[19] had 16%, Kesikinoglu et al [20] had 18.2%, Shruti A *et al*[21] had 18.6% of preterm delivery in teenage mothers. Comparatively, lower incidence in our study is due to early identification and treatment of High-risk factors contributing to preterm deliveries.

Regarding the mode of delivery, Teenage Primigravida had higher incidence of vaginal delivery 66.7% (normal - 63.9% and operative vaginal 3.4%) when compared to Adult Primigravida who had 58.3% (normal - 57.8% and operative vaginal 1.1%) of the same. Naik RR *et al*[4], showed increased vaginal delivery, with 3% of operative vaginal delivery in teenage mothers. Devi PP *et al*[15] showed 59.5% normal vaginal delivery and 8.9% had instrumental delivery, compared with adults of 42.1% of normal and 5.3% of operative vaginal delivery. Increased rate of normal delivery in Teenage Primigravida in our study was attributable to the low mean birth weight of the babies. Nearly 70% of the babies weighed < 3 kg in the study group.

The incidence of LSCS in case study group was 32.8% and that in control group is 41.1%. The most common indication for LSCS in study group is fetal distress (8.9%) followed by CPD in labour (7.8 %) This was confirmed by a study by Hoque *et al*[22], Mamatha *et al*[23] where the ceasarean section rate in teenage mothers are significantly lower when compared to Adult Primigravida. Caesarean section rate was higher in teenage group in few other studies like Dutta Indranil *et al*[24] (48.3 % vs 21.9%) Of the outcome of delivery, most of the deliveries in Teenage Primigravida group had vertex presentation. Occurrence of breech presentation was higher in Teenage Primigravida group (2.8% vs 1.1%) but there is no significant association. Mukhpodhyay *et al*[4] showed 3.15 vs 1.7% of breech presentation in teenage vs adult mothers. Baloch S *et al*[13] conducted a study on teenage mothers and found 4.23 % of them had breech presentation.

In our study, Teenage Primigravida had 1.625 times the prevalence of LBW compared to Adult Primigravida (28.89% vs 11.11%) and that of preterm babies are 10.6% vs 4.5%. Devi PP *et al*[15] in 2013-14 done a study on the risk of LBW in teenage pregnancy and found that 48.3% of babies born to teenage mothers were of LBW and 30.4% had preterm labour. And the major contributing factors were identified as Maternal Anaemia, Nutrition status, Education and Low SES.

The limitation of our study was mean age group of our teenage population is 18.62 years, so the incidence of actual fetomaternal complications, pertaining to teenage population is comparatively less. The findings of adverse maternal and fetal outcomes of adolescent pregnancy could have been confounded by unequal distribution of various socio demographic factors and could not comment on long-term postpartum difficulties and later life struggles, as no follow-up studies has been done after discharge.

CONCLUSION

Our study found that young age at marriage, poor education, low socioeconomic status, consanguinity, joint family type and lack of contraception awareness were few of the major determinants of teenage pregnancy. Maternal anemia, hypertensive disorders of pregnancy and preterm labour were the major maternal complications and teenage primigravida had higher rate of vaginal delivery when compared to Adult Primigravida. The mean birth weight of babies of teenage mothers were less than that birth weight of babies of adult mothers and low birth weight and pre term babies were major adverse neonatal outcome. Hence, we conclude that teenage pregnancy should be considered as a high-risk pregnancy and mothers should be encouraged to have regular visits to the Primary Health Centres.

Conflicts of Interest: There are no conflicts of interest

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