

A prospective descriptive study on maternal and perinatal outcome and obstetrical behaviour in teenage pregnancy

¹Dr. Sannyasi Charan Barman, ²Dr. Pratima Garain, ³Dr. Panchatapa Mahapatra, ⁴Dr Kajal Kumar Patra*, ⁵Dr Kishore P Madhwani

¹Assistant Prof., Dept of Gynae and Obstetrics, Bankura Sammilani Medical College, Bankura, West Bengal, India

²Associate Prof., Dept of Gynae and Obstetrics, Bankura Sammilani Medical College, Bankura, West Bengal, India

³Senior Resident, Dept of Gynae and Obstetrics, Bankura Sammilani Medical College, Bankura, West Bengal, India

⁴Ex-Professor and Head, Dept of Gynae and Obstetrics, Gouri Devi Institute of Medical Science, Durgapur, West Bengal, India

⁵Senior Medical Consultant, Mumbai, Maharashtra, India

(Corresponding author)

Dr Kajal Kumar Patra

Abstract:

Background : The incidence of teenage pregnancy is increasing in the world. It is considered to be a high-risk condition that leads to psychological problems and adverse perinatal and obstetric outcome. This study was conducted to study incidence, obstetric behavior and maternal and perinatal morbidity in teenage pregnancy. **Methods** : This is an observational study at department of obstetrics and gynaecology, Bankura Sammilani Medical College, Bankura, West Bengal, India from April 2020 to Sept' 2021 (1.5 yrs). This study was conducted among 106 teenage pregnant mother admitted in the department of (G&O) for delivery. Teenage mothers who were fulfilling the inclusion and exclusion criteria were included in this study. Data included in this study were; age, residence, socio economic and education status, antenatal complication, labour events, perinatal morbidity and mortality. By studying all the above mentioned factors we analyzed the incidence, obstetric behavior and perinatal morbidity in teenage pregnancy. **Results** : Study shows that mean age was 18.14 ± 0.74 yrs. It was found that 87.7% patients were Hindu and 12.3% were Muslim, 63.2% patients were from rural area and 36.8% patients were from urban area. We observed that 70.8% patients were from poor socioeconomic status and 22.6% patients were from lower middle class, 26.4% patients were illiterate and 24.9% had education up to primary school. We observed that 33.0% patients were in unbooked status. In this study, 11 (10.4%) patients had 6 - 8.4 gm% Hb, 74 (69.8%) patients had 8.5 - 11 gm% Hb. This study showed, 7 (6.6%) patients had 2+ albumin, 4 (3.8%) patients had 3+ albumin ($P \leq 0.00001$), and 11 (10.4%) patients had pre-eclampsia, 5 (4.7%) patients had eclampsia. ($P \leq 0.00001$). In this study, 38 (35.8%) patients had spontaneous onset of labour and rest of the mother required labour induction or caesarean section. In this study, 6 (5.7%) had elective CS, 25 (23.6%) had emergency CS, 8 (7.5%) had forceps delivery and 66 (62.3%) had vaginal delivery ($P \leq 0.00001$). In our study among 106 cases, 4 (3.8%) patient had complete perineal tear, 1 (0.9%) had cervical tear, 4 (3.8%) had postpartum haemorrhage and 2(1.9%) had retained placenta as complication of 3rd stage of labour ($P \leq 0.00001$). In this study, 3(2.9%) patients had <1.5Kg weight fetuses, 70 (66.0%) patients had fetuses whose weight was between 1.5Kg -2.5Kg. We observed that 102 (96.2%) patients had live birth and 4 (3.8%) patients had still birth ($P \leq 0.00001$). **Conclusion** : This study clearly states that the teenage mothers come from poor socio economic family with less education. They have complications like anaemia, pregnancy induced hypertension, eclampsia, cephalopelvic disproportion, need labour induction, increased caesarean section rate. They are also liable to have post partum haemorrhage and genital injuries. Their babies are also liable to have complications like low birth weight baby, still born and neonatal death. General health education about the risks of teenage pregnancy, strictly enforce the law for minimum age at marriage and a multidisciplinary approach

involving educationists, health workers, social workers and obstetrician and gynecologist is required to improve the adolescent's reproductive health.

Keywords: Education status, Labour induction, Perinatal death, Socio economic condition, Teenage pregnancy, Third stage complication

Introduction:

The teenage period covers the age of 11-19 years. This is a period of transition from childhood to adulthood. Approximately, 14 million children are born every year to women between 15 and 19 years old.¹ In low and middle-income countries, nearly 2.5 million births occurred to girls aged under 16 years old.² The number is increasing in both well-developed and developing countries. It is most likely affected by multifactorial conditions, i.e., socioeconomic problems and low educational level. Teenage pregnancy is considered to be a high-risk condition that leads to psychological problems and adverse perinatal and obstetric outcomes. These conditions are not easily solved because they are the result of poor health habit and lack of nutrition.³

Several studies found various obstetric and perinatal outcomes among teenage pregnancies. Preterm births, preterm premature rupture of membranes, gestational hypertension, and preeclampsia, Apgar scores below 7 at the 5th minute, anaemia, poor intrauterine growth, and stillbirths were more prevalent among teenage mothers. In addition, operative vaginal delivery, caesarean section rate, and low birth weight baby were significantly higher among women under 19 than those among older ones.⁴

Because of the adverse perinatal and maternal outcomes in teenage pregnancy, physicians must pay more attention to and

raise their awareness of the management of teenage pregnancy. Teenage mothers are at high risk of maternal and neonatal complications include maternal anaemia, hypertensive disease in pregnancy, preterm birth, urinary tract infection, postpartum haemorrhage, eclampsia and cephalopelvic disproportion, as well as adverse infant outcomes including preterm birth, poor foetal growth, low birth weight, neonatal mortality, respiratory diseases and birth trauma, besides a higher frequency of neonatal complications and infant mortality.⁵⁻⁹ Although adolescent pregnancies, especially unintended pregnancies, might carry a greater risk of adverse consequences in developing countries with limited health resources and restrictive abortion laws, pregnancy and childbirth among young women in developed countries can also pose challenges to their social, economic and physical well-being. Pregnancy during adolescence is considered a social issue associated with medical, emotional and social outcomes for the mother, child and family.¹⁰ Early marriage, in some traditional rural communities, low educational level, low level of sexual education and contraceptive use, high rate of poverty are important factors in the rate of adolescent pregnancy. Adolescent mothers are more likely to have poor prenatal health behavior and poorer health status.¹¹ In this group of women, pregnancy and delivery are not only associated with adverse pregnancy outcomes, but also associated with low school achievement, increased health care costs, and living in poverty.¹²

Aims and Objective :

1. To estimate the magnitude of teenage pregnancy pregnancy in Bankura Sammilani Medical College.
2. To find out maternal and perinatal morbidity in teenage pregnancy.
3. To assess obstetric behavior of teenage pregnancy

Materials and Methods

This is a descriptive follow up study at department of obstetrics and gynaecology, Bankura Sammilani Medical College, Bankura, West Bengal, India. This study was done from April 2020 to Sept' 2021 (1.5 yrs) among 106 teenage pregnant mother admitted in the department of (G&O) for delivery. All booked and unbooked teenage pregnant mother were included in this study. Those who have major skeletal deformity such as polio, kyphosis, scoliosis, diabetes mellitus, morbid obesity, and those who were unwilling to undergo in this study were excluded from this study.

Sample size (SS) of the proposed study is based on the following formula $n = (Z\alpha/e)^2$, where $Z\alpha = 1.96$ (two sided) at 95% confidence interval, $e =$ allowable error around the reported incidence of event of interest (here it is assumed to be sub-involution of uterus). Assuming "e" to be 20%

$= 0.2$ the sample size would be $(1.96/0.2)$. That is 96. Considering 10% loss to follow up/dropout the revised sample size is 106.

Statistical Analysis:

For statistical analysis data were entered into a Microsoft excel spread sheet and then analyzed by SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and Graph Pad Prism version 5. Data had been summarized as mean and standard deviation for numerical variables, count and percentages for categorical variables.

Z-test (Standard Normal Deviate) was used to test the significant difference of proportions.

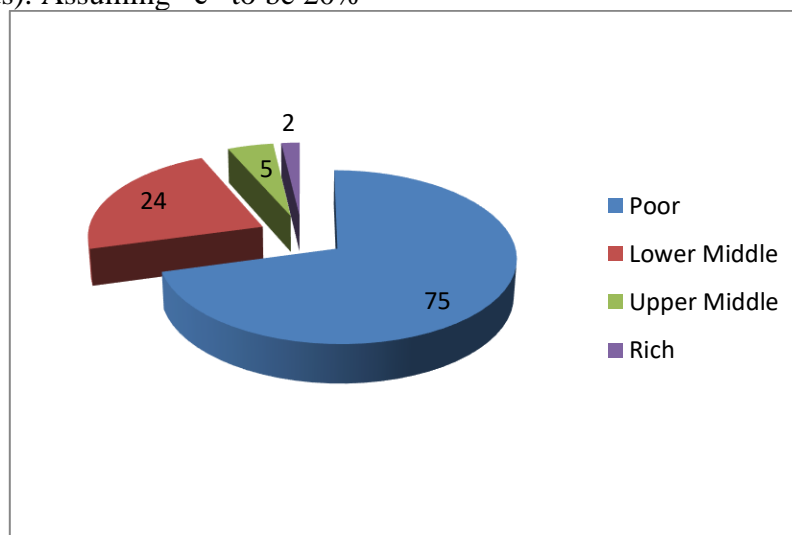
P-value ≤ 0.05 was considered statistically significant

Ethical issues: This study was conducted after getting due permission from Institutional Ethics Committee and approval of The West Bengal University of Health Sciences. Informed consent of all study subjects were sought as well.

Results

Table 1 : Distribution of participants according to age, religion, residence, socio economic status and education. (N=106)

Chart 1: Distribution of cases of teenage pregnancy according to Socio-economic status

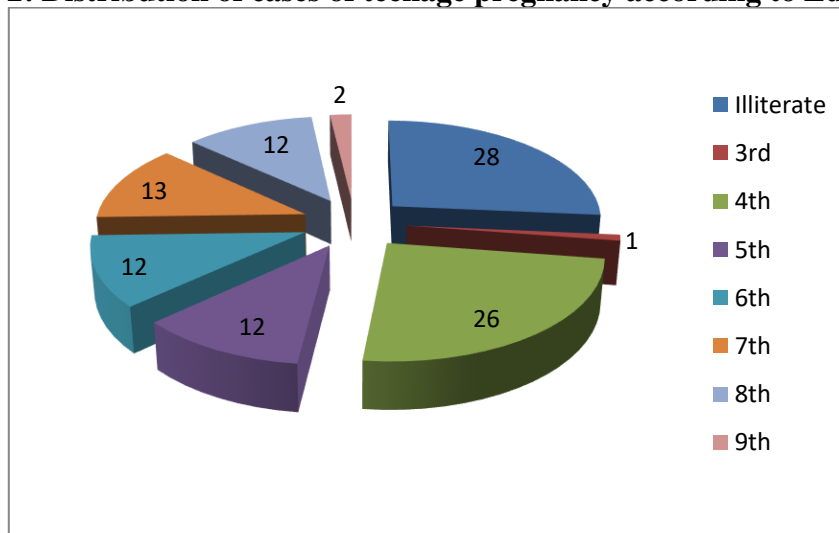


In this study, 28 (26.4%) cases were illiterate and 26 (24.5%) cases had 4th standard education, 71 (67.0%) patients had booked status and 35 (33.0%) patients had un booked status (Z value is 4.945, $P \leq 0.00001$). Table -1

In our study, 17 (16.0%) patients were 16-17 years of age and 89

(89.0%) patients were 18- 19 years with mean age (Mean \pm S.D) was $17.2075 \pm .9829$ yrs. In this study, 93 (87.7%) patients were Hindu and 13 (12.3%) patients were Muslim, 67 (63.2%) patients were from rural area and 39 (36.8%) patients were from urban area (Z value is 3.8461, $P = 0.00012$). (Table -1, Chart 1)

Chart 2: Distribution of cases of teenage pregnancy according to Education



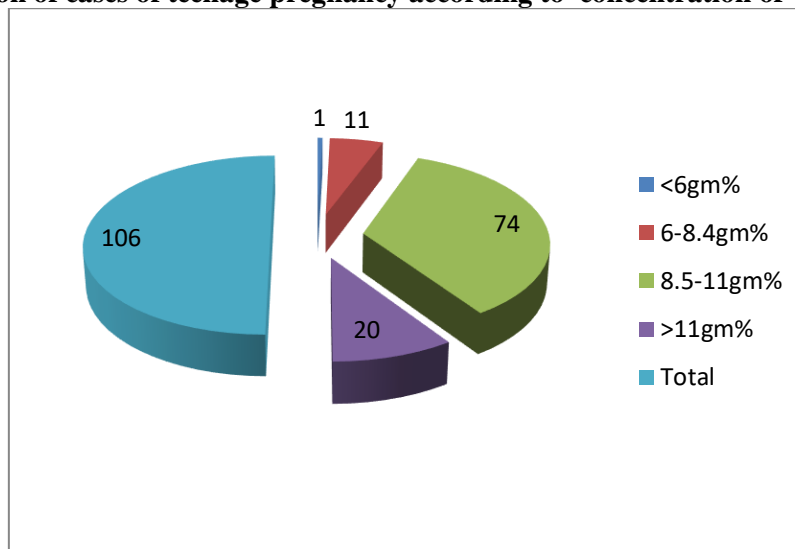
In our study, 75 (70.8%) patients were from poor class, 24 (22.6%) patients were from lower middle class (Z value is 7.0207, $P \leq 0.00001$). Table -1, Chart 2

Table -2 : Distribution of participants according to different antenatal parameters.

Antenatal parameters	Frequency	Percentage (%)	Mean	SD
Gestational Age(Weeks)			36.8962	1.9466
Hb gm% - < 6	01	0.9		
6 – 8.4	11	10.4	10.1057	1.2546
8.5 – 11	74	69.8		
> 11	20	18.9		
Urine albumin - No.	90	84.9		
Trace-	02	1.9		
1+	03	2.8		
2+	07	6.6		
3+	04	3.8		
Antenatal complications -				
Anemia	08	7.6		
Miscarriage	03	2.8		
Pre eclampsia	11	10.4		
Eclampsia	05	04.7		
Placenta Previa	01	0.9		
None	78	74		
Intervention at labour –				
Spontaneous onset	38	35.8		
Augmentation by ARM	12	11.3		
ARM & Oxytocin	26	24.5		

Dinoproston gel	03	2.8		
Oxytocin	16	15.1		
Selected for CS	11	10.4		
Mode of delivery -				
Vaginal delivery	66	62.3		
Breech delivery	01	0.9		
Forceps delivery	08	7.5		
Em CS	25	23.6		
El CS	06	5.7		
Indication of CS –				
Vagina delivery	76	71.7		
Breech	02	1.9		
CPD	08	7.5		
DTA	01	0.9		
Eclampsia	03	2.8		
Face presentation	02	1.9		
Foetal distress	08	7.5		
APH	01	0.9		
Non progress of Labour	03	2.8		
Pre eclampsia	01	0.9		
PROM	02	1.9		
Third stage complications -				
CPT	04	3.8		
Cervical Tear	01	1.0		
Retained placenta	02	1.9		
PPH	04	3.8		
Normal	95	89.6		

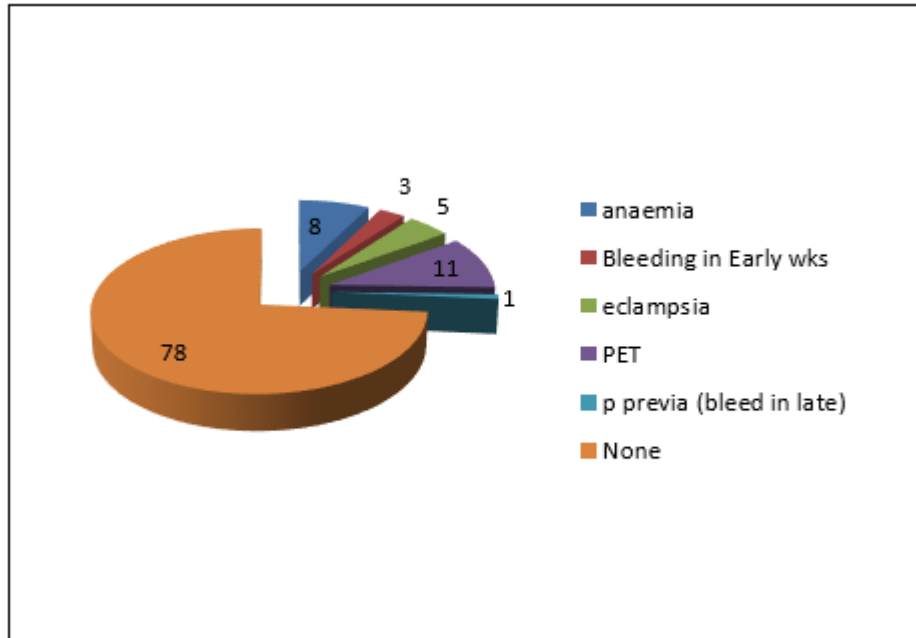
Chart 3: Distribution of cases of teenage pregnancy according to concentration of haemoglobin.



In this study, 1 (0.9%) patients had < 6gm% Hb, 11 (10.4%) patients had 6 - 8.4 gm% Hb, 74 (69.8%) patients had 8.5 - 11 gm% Hb and

only 20 (18.9%) patients had >11 gm% Hb with mean Hb% (Mean ± S.D) of patient was 10.1057 ± 1.2546 gm%. Table -2, Chart -3

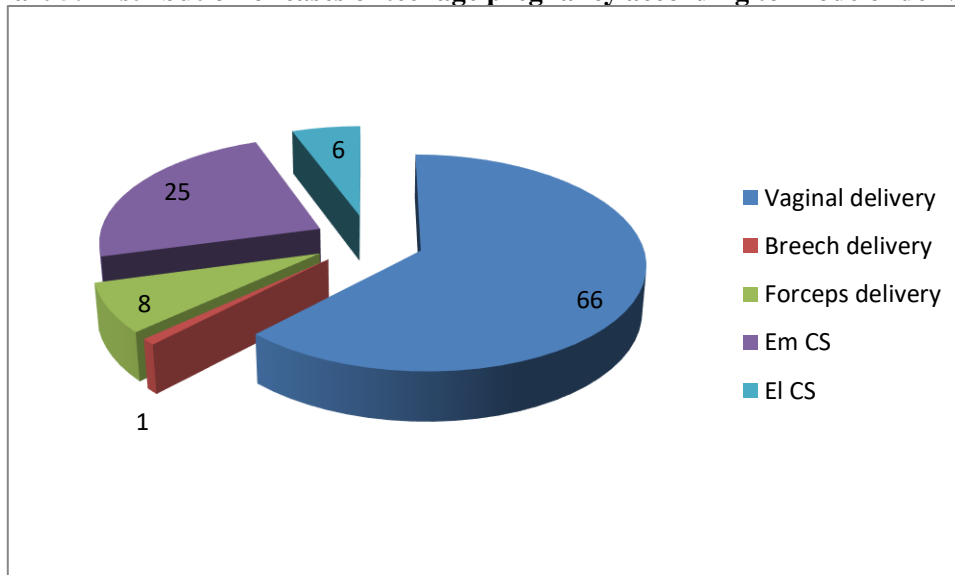
Chart 4: Distribution of cases of teenage pregnancy according to Antenatal complication



This study showed, 7 (6.6%) patients had 2+ albumin, 4 (3.8%) patients had 3+ albumin (Z value is 11.4422, $P \leq 0.00001$). In our study, 8 (7.6%) patients had anaemia, 3 (2.8%) patients

had bleeding in early weeks, 11 (10.4%) patients had pre eclampsia, 5 (4.7%) patients had eclampsia. (Z value is 9.7911, $P \leq 0.00001$). Table -2, Chart - 4

Chart 5: Distribution of cases of teenage pregnancy according to Mode of delivery



In this study, 38 (35.8%) patients had spontaneous onset of labour, 12 (11.3%) patients had labour augmented by ARM, 26 (24.5%) patients had labour augmented by ARM + oxytocin, 3 (2.8%) patients had dinoprostone gel induced labour, 16 (15.1%) patients had Labour induced by oxytocin and 11 (10.4%) patients were selected for CS. In this study, 1 (0.9%) patient had breech delivery, 6 (5.7%) had elective CS, 25 (23.6%) had emergency CS, 8 (7.5%) had

forceps delivery and 66 (62.3%) had vaginal delivery (Z value is 5.689, $P \leq 0.00001$). In this study, 1 (0.9%) patient had APH in indication of CS, 2 (1.9%) had breech, 8 (6.6%) had CPD, 1 (0.9%) had DTA, 3(2.8%) had eclampsia, 2 (1.9%) had face presentation, 8 (6.6%) had fetal distress, 3(2.8%) had eclampsia, 1 (0.9%) had PET, and 2 (1.9%) had PROM in indication of CS. In our study among 106 cases, 4 (3.8%) patient had complete perineal tear, 1 (0.9%) had cervical

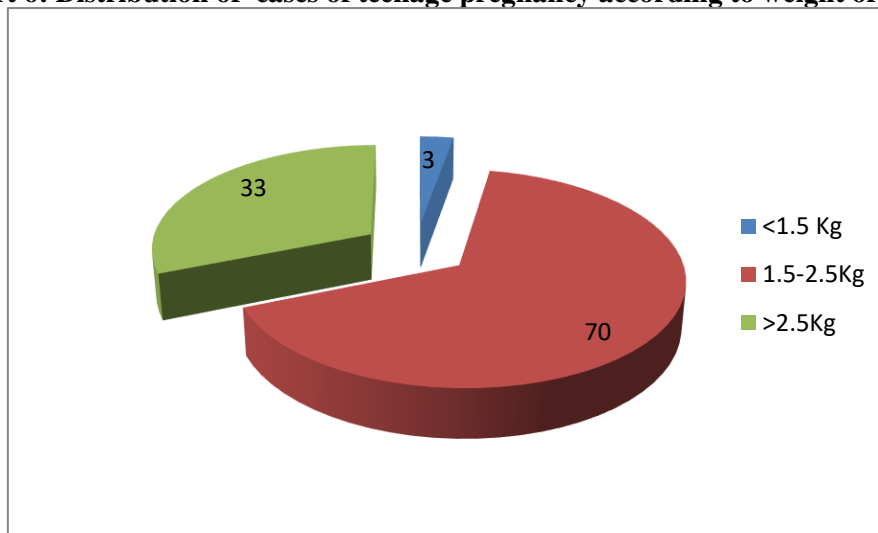
tear, 4 (3.8%) had postpartum haemorrhage and 2 (1.9%) had retained placenta as

complication of 3rd stage of labour. (Z value is 12.4489, $P \leq 0.00001$). Table – 2. Chart – 5

Table -3 : Distribution of participants according to different foetal parameters

Foetal Parameters	Frequency	Percentage (%)	Mean	SD
Foetal weight (Kg) –				
< 1.5	03	2.9	2.4238	0.3857
1.5 – 2.5	70	66.0		
> 2.5	33	31.4		
Live birth	102	96.2		
Still born	04	3.8		
Perinatal death –				
No	97	91.04		
Yes	09	8.6		

Chart 6: Distribution of cases of teenage pregnancy according to weight of Fetus.



In this study, 3 (2.9%) patients had <1.5Kg weight fetuses, 70 (66.0%) patients had fetuses whose weight was between 1.5Kg -2.5Kg and 33 (31.4%) patients had fetuses of >2.5 Kg with mean foetal weight (Mean \pm SD) was $2.4238 \pm .3857$ kg. Table -3, Chart – 6.

In our study, foetal outcome shown, 102 (96.2%) patients had live birth and 4 (3.8%) patients had still birth (Z value is 13.3873, $P \leq 0.00001$)

Discussion:

This descriptive observational study was conducted at the Department of Obstetrics and Gynaecology, Bankura Sammilani Medical College, Bankura from Apr’2020 - Sep’2021 (1.5 yrs) among 106 teenage eligible

pregnancies who fulfill inclusion and exclusion criteria.

In our study period, the total number of deliveries was 29,981 and the number of teenage deliveries was 1,139. We found that the incidence of teenage deliveries was 2.8%.

Rexhepi M *et al*¹³ (2019) found that total number of 5643 births, 128 (2.27%) were from adolescent pregnancies.

In our study, mean age (Mean \pm S.D) of patients was $17.2075 \pm .9829$ yrs. Andriyana H *et al*¹⁴ (2016) compared 350 randomly selected teenage mothers (aged 12-18 years) with 350 randomly selected primi gravida mothers (aged 19-39) over the same period. In teenage group, the mean of age was 17.3

yrs.

In this study, 93 (87.7%) patients were Hindu and 13 (12.3%) patients were Muslim, 67 (63.2%) patients were from rural area and 39 (36.8%) patients were from urban area (Z value is 3.8461, $P \leq 0.0001$). Moraes AN *et al*¹⁵ (2018) found that high rates of adolescent pregnancies in Luapula province are likely as a result of the predominantly rural and poor population. This is similar to our study as most of the cases of teenage pregnancy in our study are from rural area.

In our study, 75 (70.8%) patients were from poor class, 24 (22.6%) patients were from lower middle class (Z value is 7.0207, $P \leq 0.00001$). Andriyana H *et al*¹⁶ (2016) compared 350 randomly selected teenage mothers (aged 12-18 years) with 350 randomly selected primigravida (aged 19-39) yrs and stated that most of the teenage pregnancy mother were unemployed (55.1%) and husbands were doing labour work as occupation (56%). We also found that most of teenage pregnancy was found in poor socio-economic group (70.5%).

In this study, 28 (26.4%) cases were illiterate and 26 (24.5%) cases had 4th standard education, 71 (67.0%) patients had booked status and 35 (33.0%) patients had un booked status (Z value is 4.945, $P \leq 0.00001$). The study of Andriyana H *et al*¹⁶ (2016) shown most of the teenage mothers education were junior high school (78.3%). The study of Sharma AK *et al*¹⁷ (2003) shown 61.25% of teenage mothers were booked cases.

In this study, 1 (0.9%) patients had < 6gm% Hb, 11 (10.4%) patients had 6 - 8.4 gm% Hb, 74 (69.8%) patients had 8.5 - 11 gm% Hb. Rexhepi M *et al*¹³ (2019) found that adolescents compared to adult mothers had a higher rate of maternal anaemia (26% v vs. 15%). Ramachandra C *et al*¹⁸ (2016) showed that anaemia was found to be higher in teenage group.

Ramachandra C *et al*¹⁸ (2016) showed that PIH was found higher in the study group (teenage pregnancy vs. adult pregnancy) than the control group. Usta I M *et al*¹⁹ (2008) showed that pre-eclampsia was more commonly encountered in teenage pregnancy (2.9% vs. 0.6%, $p = 0.012$). This present study shown similar results - 11 (10.4%) patients had pre eclampsia, 5 (4.7%) patients had eclampsia. (Z value is 9.7911, $P \leq 0.00001$).

In this study, 38 (35.8%) patients had spontaneous onset of labour and rest of the mothers need labour augmentation for delivery. In this study, 6(5.7%) had elective CS, 25 (23.6%) had emergency CS, 8 (7.5%) had forceps delivery. A case control study among teenage and adult pregnancy by Ramchandra C *et al*¹⁸ (2016) shown that vaginal delivery was 61.5% compared to 80.5% in the control group. Instrumental delivery rate, emergency LSCS and elective LSCS rates were higher in the study group (teenage pregnancy) compared to the control group. Lisonkova S *et al*²⁰ (2017) found that maternal morbidity was significantly higher among teenage mothers than those of 25–29 yrs. Abbas AM *et al*²¹ (2017) found that obstetric complications were higher among the teenage mothers.

In this study, 3 (2.9%) patients had <1.5Kg weight fetuses, 70 (66.0%) patients had fetuses whose weight was between 1.5Kg - 2.5Kg with mean foetal weight (Mean \pm SD) was $2.4238 \pm .3857$ kg. Table -3, Chart – 18(6). Fetal outcome of 106 teenage pregnancies showed, 102(96.2%) babies had live birth and 4(3.8%) had still birth (Z value is 13.3873, $P \leq 0.00001$). Ogawa K *et al*²² (2019) showed low birth weight (45.5%) and low Apgar score (6.6%) were significantly higher among adolescent women compared to women of 20–24 years of age. Moraes AN *et al*¹⁵ (2018) found that children born to mothers younger than 20 yrs were at increased risk for low birth weight. Lisonkova S *et al*²⁰ (2017) found that adverse foetal and neonatal

outcomes; neonatal mortality was elevated in teen mothers. Our study have similarity with these studies.

Conclusions

The present study was an attempt to throw light on the different socio-demographic characteristics relating to teenage pregnancy and their outcome and complications. This study clearly states that the teenage mothers come from poor socio economic family with less education. They have complications like anaemia, pregnancy induced hypertension, eclampsia, cephalopelvic disproportion, need labour induction, increased caesarean section rate. They are also liable to have post partum haemorrhage and genital injuries like complete perineal tear and cervical tear. Their infants are also liable to have complications like low birth weight baby, still born, neonatal death.

General health education about the risks of teenage pregnancy, strictly enforce the law for minimum age at marriage, screening of pregnant mothers for risk factors and provide teenage mothers with education about childbearing and rearing and referral to a tertiary hospital for safe delivery. A well-acting social welfare system including appropriate psychosocial support and prenatal care improves the obstetric outcome in teenage mothers significantly. A multidisciplinary approach involving educationists, health workers, social workers and obstetrician and gynecologist is required to improve the adolescent's reproductive health

Acknowledgements :

Authors would like to acknowledge the patients who participated in this research study.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

References :

1. UNICEF, "Young people and family planning: teenage pregnancy," 2015, http://www.unicef.org/malaysia/Teenage_Pregnancies_-_Overview.pdf.
2. S. Neal, Z. Matthews, M. Frost, H. Fogstad, A. V. Camacho, and L. Laski, "Childbearing in adolescents aged 12–15 years in low resource countries: a neglected issue. New estimates from demographic and household surveys in 42 countries," *Acta Obstetrica et Gynecologica Scandinavica*, vol. 91, no. 9, pp. 1114–1118, 2012.
3. B. S. Zuckerman, D. K. Waller, D. A. Frank, C. Chase, and B. Hamburg, "Adolescent pregnancy: biobehavioral determinants of outcome," *The Journal of Pediatrics*, vol. 105, no. 6, pp. 857–863, 1984.
4. A. Bacci, G. M. Manhica, F. Machungo, A. Bugalho, and M. Cuttini, "Outcome of teenage pregnancy in Maputo, Mozambique," *International Journal of Gynecology & Obstetrics*, vol. 40, no. 1, pp. 19–23, 1993.
5. O. Bukulmez and O. Deren, "Perinatal outcome in adolescent pregnancies: a case-control study from a Turkish university hospital," *European Journal of Obstetrics & Gynecology and Reproductive Biology*, vol. 88, no. 2, pp. 207–212, 2000.
6. D. Ukil and U. I. Esen, "Early teenage pregnancy outcome: a comparison between a standard and a dedicated teenage antenatal clinic," *Journal of Obstetrics and Gynaecology*, vol. 22, no. 3, pp. 270–272, 2002.
7. Ezegwui HU, Ikeako LC, Ogbuefi F. Obstetric outcome of teenage pregnancies at a tertiary hospital in Enugu, Nigeria. *Niger j Clin Pract.* 2012;15(2):147–50. <https://doi.org/10.4103/1119-3077.97289> PMID:22718161. [PubMed] [Google Scholar]
8. Lee SH, Lee SM, Lim NG, Kim HJ,

- Bae SH, Ock M, Kim UN, Lee JY, Jo MW. Differences in pregnancy outcomes, prenatal care utilization, and maternal complications between teenagers and adult women in Korea. *Medicine*. 2016;95(34):e4630. <https://doi.org/10.1097/MD.00000000000004630> PMID:27559960 PMCID:PMC5400327. [PMC free article] [PubMed] [Google Scholar]
9. Cavazos-Rehg PA, Krauss MJ, Spitznagel EL, Bommarito K, Madden T, Olsen MA, Subramaniam H, Peipert JF, Bierut LJ. Maternal age and risk of labor and delivery complications. *Matern Child Health J*. 2015;19(6):1202–1211. <https://doi.org/10.1007/s10995-014-1624-7> PMID:25366100 PMCID:PMC4418963. [PMC free article] [PubMed] [Google Scholar]
 10. Black AY, Fleming NA, Rome ES. Pregnancy in adolescents. *Adolesc Med State Art Rev*. 2012;23:123–38. PMID:22764559. [PubMed] [Google Scholar]
 11. Kingston D, Heaman M, Fell D, Chalmers B Maternity Experiences Study group of the Canadian Perinatal Surveillance System. Public Health Agency of Canada. Comparison of Adolescent, young adult, and adult women's maternity experiences and practices. *Pediatrics*. 2012;129:1228–37. <https://doi.org/10.1542/peds.2011-1447> PMID:22529278. [PubMed] [Google Scholar]
 12. Kawakita T, Wilson K, Grantz k, Landy HJ, Huang Ch, Lobo VG. Adverse maternal and neonatal outcomes in adolescent pregnancy. *J Pediatr Adolesc Gynecol*. 2016;29(2):130–136. <https://doi.org/10.1016/j.jpag.2015.08.006> PMID:26327561 PMCID:PMC4886236. [PMC free article] [PubMed] [Google Scholar]
 13. Rexhepi M, Besimi F, Rufati N, Alili A, Bajrami S, Ismaili H. Hospital-based study of maternal, perinatal and neonatal outcomes in adolescent pregnancy compared to adult women pregnancy. *Open access Macedonian journal of medical sciences*. 2019 Mar 15;7(5):760.
 14. Andriyana H, Amelya M, Nababan B, Rusdianto E. Outcome and risk of obstetric complication in teenage pregnancy in tertiary center hospital in Indonesia. *KnE Medicine*. 2016 Oct 4:70-5.
 15. Moraes AN, Likwa RN, Nzala SH. A retrospective analysis of adverse obstetric and perinatal outcomes in adolescent pregnancy: the case of Luapula Province, Zambia. *Maternal health, neonatology and perinatology*. 2018 Dec;4(1):1-1
 16. Andriyana H, Amelya M, Nababan B, Rusdianto E. Outcome and risk of obstetric complication in teenage pregnancy in tertiary center hospital in Indonesia. *KnE Medicine*. 2016 Oct 4:70-5.
 17. Sharma AK *et al.*; Pregnancy in adolescents: A community based study. *Ind. J. of Prev. Soc. Med*. 2003 Jan, 34 (1,2): 24-32.
 18. Ramachandra C, Roopa NK, Rekha N, Nirupama YS. The impact of teenage pregnancy on maternal and perinatal outcome. *International Journal of Medical Research & Health Sciences*. 2016;5(5):149-52.
 19. Usta IM, Zoorob D, Abu-Musa A, Naassan G, Nassar AH. Obstetric outcome of teenage pregnancies compared with adult pregnancies. *Acta Obstetrica et Gynecologica Scandinavica*. 2008 Jan 1;87(2):178-83.
 20. Lisonkova S, Potts J, Muraca GM, Razaz N, Sabr Y, Chan WS, Kramer MS. Maternal age and severe maternal morbidity: a population-based retrospective cohort study. *PLoS medicine*. 2017 May 30;14(5):e1002307.
 21. Abbas AM, Ali SS, Ali MK, Fouly H, Altraigey A. The maternal and neonatal outcomes of teenage pregnancy in a

- tertiary university hospital in Egypt. Proceedings in Obstetrics and Gynecology. 2017;7(3):1-0.
22. Ogawa K, Matsushima S, Urayama KY, Kikuchi N, Nakamura N, Tanigaki S, Sago H, Satoh S, Saito S, Morisaki N. Association between adolescent pregnancy and adverse birth outcomes, a multicenter cross sectional Japanese study. Scientific Reports. 2019 Feb 20;9(1):1-8.