

Adverse Reproductive Outcomes Associated with Teenage Pregnancy in Three Maternity Hospitals in Asmara, Eritrea

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Abstract: *Background:* The highest rate of teenage pregnancy in the world is found in Sub Saharan Africa. Thus, out of the twenty countries with the highest rate of teen marriage, Eritrea ranked fourteenth. The aim of this study was to assess adverse outcomes associated with teenage pregnancy. *Methods:* A retrospective cohort study was followed for 424 nulliparous pregnant women between the age of 14 and 24 years. The maternity clinical record was used to review data on maternal spontaneous abortions, preterm birth, method of delivery, postpartum hemorrhage, perineal laceration, baby weight, Apgar score at 5 minute and congenital anomalies were taken as our variables of interest. Moreover, face-to-face interview was conducted to enlighten the socio demographic characteristics, circumcision status of the mother and antenatal care visits during their last pregnancy. Descriptive and inferential data was analyzed using SPSS version 20. Chi-square test and bivariate logistic regression were also used. *Results:* The socio demographic characteristic of the study shows that the educational status of teenage mother was low compared to adult mothers; in-addition unmarried teenage mothers were high compared to adult mothers. In this study teenage mothers had significantly higher anemia, preterm delivery, Post-partum hemorrhage and low birth weight babies as compared to the adult mothers. Also, the study revealed that compared to adult mothers, teenage mothers had significantly higher abnormal delivery mode with low Apgar score among teenage mothers. *Conclusions:* In this study adolescent pregnancy was found to be associated with increased outcomes of anemia, preterm birth, low birth weight, abnormal delivery and post-partum hemorrhage. Even though preeclampsia and Apgar score were not significantly different between adolescents and adult mothers this should not be ignored and just bypass it not as adverse outcomes of teenage.

Keywords: Pregnancy, Teenage, Adverse Effect Preterm, Low Birth Weight

1. Introduction

Adolescence is a transitional phase of growth and development between childhood and adulthood and WHO defines it as any person between the age 10 and 19 [1]. Adolescent or teenage pregnancy can be defined as gestation in women before having reached the full somatic development [2].

About 16 million girls aged 15 - 19 and 2 million girls

under the age of 15 give birth every year. In the poorest regions of the world, this figure rises to over one in three girls [3]. Even though it highly varies regionally depending on cultural, religious, political, economic and other factors. The highest rate of teenage pregnancy in the world is in sub Saharan Africa [4]. Out of the twenty countries with the highest rate of child marriage, Nigeria ranked first and

Eritrea ranked fourteenth [5].

The percentage of teenage pregnancy in Eritrea was 11 percent in 2010 [6]. Even though this percentage seems to be small, teenage mothers are at greater risk of having medical complications, such as, Anemia, depression, unsafe abortion, spontaneous abortions, preterm labor and delivery, pre-eclampsia and eclampsia, ante/ postpartum hemorrhage and fetopelvic disproportion with its attendant risks of high operative intervention rates, obstructed labor and obstetric fistula are other additional outcomes faced by teenage mothers. The rates of preterm birth, low birth weight and asphyxia are higher among the children of adolescents, all of which increase the chance of death and future health problems of the baby [3].

Operational Definition

Maternal age was defined as completed years at the time of delivery. Abnormal delivery includes vacuum delivery (vaginal operative delivery) and cesarean section (abdominal operative delivery). Post-Partum Hemorrhage (PPH) was defined as blood loss greater than 500 ml following birth of baby during the hospital stay. Anemia as hemoglobin level less than 11mg/dl, Low birth weight as birth weight of a neonate less than 2500g, Low Apgar score as an Apgar score <7 at five-minute, Preterm birth as neonate whose gestational age is below 37 weeks, Perineal laceration as any accidental tear during delivery in the perineal region, and Pre-eclampsia and Eclampsia as Blood pressure >140/90 and >160/100 respectively.

2. Methods

2.1. Study Design

A retrospective cohort study was carried among 424 nulliparous pregnant women between the age of 14 and 24 years, inclusively with a live singleton birth during January - December 2018 in Asmara, Eritrea.

2.2. Study Setting and Population

The study was conducted in three maternity hospitals of Asmara, Eritrea. The two hospitals namely Edaga-Hamus Maternity hospital and Betmekae Community Hospital are public hospitals whereas; Sembel Polyclinic Hospital is a private institution. All (165) mothers below the age of 20 delivered in these hospitals between January 2018 and December 2018, excluding women with chronic illness and mental problems, were selected as mothers exposed to teenage pregnancy. For each exposed mother two non-exposed mothers aged 20-24 were selected and matched for. Therefore, the initial sample size was 495 mothers. For these 495 mothers secondary data was collected from the maternity hospital delivery cards. In order to gather the primary data we had to contact each mother using the telephone number registered in the hospital. However the telephone of 46 mothers was not working or registered as a wrong number and 25 mothers were not in this country at the time of the study. This makes the finally sample size for the study to be

424.

2.3. Data Collection

The maternity clinical record was reviewed and data on maternal hemoglobin and blood pressure level, spontaneous abortions, preterm birth, method of delivery, postpartum hemorrhage, perineal laceration, baby weight, Apgar score at five minute and congenital anomalies were taken as variables of interest.

Interview: Each mother was invited, using telephone, to come to the National Union of Eritrean Women (N. U. E. W) office. Face-to-face interview was conducted to collect information on socio demographic characteristics, circumcision status of the mother and antenatal care visits during their last pregnancy was gathered. Based on the final sample size of 424 mothers the power of the study was calculated using this formula.

$$z_{1-\beta} = \sqrt{\left(n * \frac{(p_1 - p_0)^2}{(p_1 q_1 + p_0 q_0)} \right)} - z_{1-\alpha/2}$$

$Z_{1-\beta}$ = value of the standard normal distribution corresponding to the power of the study.

P_0 = Proportion of complications among controls (0.087)

P_1 = proportion of complications among cases (0.174)

$q_0 = 1 - P_0$ (0.913)

$q_1 = 1 - P_1$ (0.826)

n = the number of subjects in the study group 144

$Z_{1-\alpha/2}$ = Value of the standard normal distribution corresponding to a significance level of alpha 1.96 for a two-sided test at the 0.05 level

$Z_{1-\beta}$ was calculated as 39.7%.

2.4. Statistical Analysis

Both descriptive and inferential data was analyzed using SPSS version 20. First Chi-square test was used to calculate significance test of all categorical variables. Economic status, family support, marital status, circumcision, and educational level were the known confounding factors. Study participants were having similar characteristics in these variables except in economic status. Hence bivariate Logistic regression was used to calculate odds ratio maternal and fetal outcomes by controlling economic status. Finally, results were presented using tables.

2.5. Ethical Considerations

A formal letter was written from school of Public health to study area and permission was obtained from the hospitals. Another formal letter was used to ask cooperation by NUEW in order to use their place for gathering mothers to interview. After a brief explanation of the purpose of the study, written consent was obtained from the study participants. Confidentiality was assured by excluding personal identifiers. Participants had the right to withdraw from the study at any time.

3. Results

3.1. Socio-demographic Profile

Table 1. Socio-demographic characteristics of the mothers were.

Maternal Characteristics		Teenage	Adult	P-value
Age years	14-15	3 (2.08%)	-	0.001
	16-17	45 (31.25%)	-	
	18-19	96 (66.66%)	-	
	20-21	-	61 (21.78%)	
	22-23	-	146 (52.14%)	
	24	-	73 (26.07%)	
Educational level	Junior	3 (2.08%)	0 (0%)	0.015
	High school	142 (97%)	280 (100%)	
Marital status	Unmarried	9 (6.25%)	7 (2.5%)	0.055
	Married	135 (93.75%)	273 (97.5%)	
Circumcision	No	3 (2.08%)	3 (1.07%)	0.570
	Yes	140 (97.2%)	273 (97.5%)	
	Unknown	1 (0.69%)	4 (1.42%)	
Economic status	High	0 (0%)	0 (0%)	0.204
	Middle	70 (48.61%)	118 (42.1%)	
	Low	74 (51.38%)	162 (57.85%)	
Family support	Yes	140 (97.3%)	277 (98.9%)	0.192
	No	4 (2.7%)	3 (1.07%)	
Antenatal visit	More than four times	144 (100%)	280 (100%)	

Table 1 shows 33.96% were teenagers and 66.03% were adults. The mean age of teenagers was 17.88 (\pm SD 1.02) and that of adults was 22 (\pm SD 1.02). Regarding to the educational levels all adult mothers and 97% of teenagers were high school. There was statistically significant

difference on mean age among the two groups ($p=0.0001$). Similarly, educational level was lower among teenagers ($p=0.015$). However, there was no statistically significant difference among the other socio demographic variables.

3.2. Pregnancy Related Complications

Table 2. Anemia and Preeclampsia/eclampsia among teenage and adult mothers.

Out come	Teenagers	Adults	O. R, 95% C. I., P-value
Maternal Anemia	35 (24.3%)	31 (11.1%)	2.56 (1.505-4.382) 0.01
Preeclampsia/Eclampsia	1 (0.7%)	7 (2.5%)	0.28 (0.035-2.352) 0.24

Table 2 There was statistically significant difference in maternal anemia ($OR: 2.568$; $95\% CI: 1.505 - 4.382$).

3.3. Delivery Complications

Table 3. Postpartum hemorrhage and Perianal laceration were among teenage and adult mothers.

	Teenagers	Adults	O. R (95% C. I.) P value
Postpartum haemorrhage	43 (29.9%)	15 (5.4%)	0.13 (0.072-0.253) 0.001
Perennial laceration	3 (2.1%)	31 (11.1%)	6.28 (1.879-21.049) 0.003

Table 3 shows that postpartum hemorrhage was significantly higher among teenagers compared to adult mothers ($OR: 0.135$; $95\% CI: 0.072-253$). However,

Perinatal laceration was found to be significantly lower among teenagers (2.1%) when compared to adults (11.1%) ($OR: 6.288$; $95\% CI: 1.879-21.049$).

Table 4. Method of delivery among teenagers and adult mothers were.

		Teenagers	Adults	O. R (95% C. I.) P value
Normal delivery	SVD*	23 (16.0%)	129 (46.1%)	6.356 (3.862-10.460) 0.001
	Episiotomy	57 (39.6%)	120 (42.8%)	
Abnormal delivery	Vacuum	13 (9%)	7 (2.5%)	
	Caesarean	51 (35.4%)	24 (8.6%)	

*spontaneous Vaginal Delivery

As indicated in table 4 abnormal delivery was significantly higher among teenage mothers (44.4%) compared to adult

mothers (11.1%) (*OR*: 6.356135; 95% *CI*: 3.862–10.460)

Table 5. Indications for Caesarean section among teenagers and adult mothers.

Indication for cesarean section	Teenagers (51)	Adults (24)	O. R., (95% C. I.), P Value
CPD*	16 (80%)	4 (20%)	0.093 (.030-.284) 0.001
Maternal epilepsy ^a	1 (100%)	0 (0%)	0.210 (0.034-1.289) 0.09
Fetal distress	10 (62.5%)	6 (37.5%)	0.47 (.141-1.599) 0.2
Maternal distress	3 (50%)	3 (50%)	1.214 (0.455-3.234)
Twin pregnancy	1 (100%)	0 (0%)	-
Prolonged labor	6 (60%)	4 (40%)	0.289 (.079-1.058)
Breech presentation	11 (73.3%)	4 (26.6%)	0.210 (.061-.716)
Eclampsia	1 (100%)	0 (0%)	-
Still birth	1 (100%)	0 (0%)	-
ERM*	1 (33.3%)	2 (66.6%)	0.840 (0.075-9.460)
Overweight baby	0 (0%)	1 (100%)	-

* CPD: cephalo-pelvic disproportion; ERM: early rupture of membrane^a No explanation was found - Cannot be calculated because of zero frequency in a cell.

As described in table 5 CPD indication for caesarian section was significantly higher among teenagers (80%) compared to adults (20%) (*OR*: 0.093; 95% *CI*: 0.030-.284). Breech presentation was also significantly higher among teenagers (73.3%) when compared to adults (26.6%) (*OR*:

0.210; 95% *CI*: 0.061-0.7160) while maternal epilepsy, Fetal distress, Maternal distress, Twin pregnancy, Prolonged labor, Eclampsia, Stillbirth, ERM and overweight baby were not significantly different.

3.4. Adverse Birth Outcomes

Table 6. Neonatal outcomes among teenagers and adult mothers.

	Teenagers (144)	Adults (280)	O. R., 95% C. I., p-value
Preterm birth	87 (60.4%)	45 (16.0%)	6.13 (3.7-10.1) 0.001
Post term birth	3 (2.08%)	2 (0.71%)	0.21 (0.03-1.28) 0.09
Low birth weight	71 (49.3%)	24 (8.6%)	0.09 (0.05-0.16) 0.001
Low Apgar score	6 (4.2%)	14 (5%)	1.21 (0.455-3.234) 0.6

As indicated in table-6: preterm birth was significantly higher among teenagers (60.4%) compared to adults (16.0%) (*OR*: 6.138; 95% *CI*: 3.749 – 10.104) and low birth weight was also significantly higher (49.3%) teenagers verse (8.6%) adults (*OR*: 0.094; 95% *CI*: 0.055–0.161). However, there was no statistically significant difference on post term birth and low Apgar score at 5 minutes among the two groups.

4. Discussion

It is often argued that the adverse reproductive outcome in teenage pregnancy is due to the social, economic and behavioral factors rather than the biological effect of young age. In this study statistical analysis was done by controlling economic status, family support, marital status, circumcision, and educational level of all mothers and pregnancy outcomes were computed.

The study showed that there was significant difference on educational level were teenagers (97%) and adults (100%) were high school ($p=0.015$). This finding was similar with studies in Baghdad and Nigeria where they found statistically lower educational level among teenagers with ($p=0.0001$) and ($p=0.001$) respectively [7, 8]. In this study unmarried teenagers were higher (6.25%) compared with adults (2.5%) though it was insignificant ($p=0.055$). Likewise, the study done in India found out that marital status to be insignificant among the two groups ($p=1$) [9]. In contrast, the studies done in Nigeria and Cameroon found that teenage mothers were

significantly unmarried ($p=0.000$) and ($p 0.000$) respectively [8, 2]. The main reason for less unmarried mothers attending hospital to deliver in our finding could be due to common practice for unmarried mothers to go either for termination of pregnancy or home delivery because of strong social taboo preventing them to attend large public hospitals. In our study we found out no statistically significant difference on antenatal visit among mothers, all mothers had attended antenatal care at list four times. This was higher than a study done in Cameroon were 71.92% of teenagers and 72.38% of adults have gone to antenatal care least 4 times [2]. Our finding was in contrast to a study done in Baghdad where they found 53.5% of teenagers vs. 73.9% of adults had attended antenatal care visits ($p=0.0001$) [7]. The reason for this high attendance of mothers for antenatal care in our study could be because our study was conducted in urban setting were all the mothers could have access to health care facility and the regular health education given to community through different channels. This study did not come across significant difference on circumcision status, economic status and family support.

In this study teenage mothers were having significantly higher anemia (24.3%) as compared to the adult mothers (11.1%) (*OR*: 2.568; 95% *CI*: 1.505-4.382). This finding was comparable to a study conducted in Baghdad teaching hospital were anemia was found significantly higher among teenagers (42.5%) compared to (21.3%) adults (*OR*: 6.13; 95% *CI*: 3.48-10.9) and in Nigeria were anemia was found among teenagers

(22.9%) compared to adults (6.1%) ($p=0.000$) [7, 8]. The study carried out in Banaras Hindu university found out that anemia was insignificantly different among teenagers (62.9%) compared to adults (63.9%) ($p>0.05$) and in Shadan Institute of Medical Sciences India were (5%) teenagers and (6.7%) adults were anemic ($p=0.697$) [10, 9]. The reason for this higher anemia among teenage mothers compared to adults in our study could be due to the effect of the girl becoming pregnant before her own growth and competing with developing fetus for nutrients [10].

Postpartum hemorrhage was found to be significantly higher among teenagers (24.3%) mean blood loss of 361.458 (\pm SD116.4328) compared to adults (11.1%) ($OR: 0.135; 95\% CI: 0.072-0.253$). Our finding was consistent with a study done in Niger Delta University, were Postpartum hemorrhage was found significantly higher 34.9% among teenagers and 12.8% among adults ($P=0.000$) [8]. In contrast to our study, studies done in Nepal, Baghdad, India and Cameroon found no statistically significant difference on Postpartum hemorrhage among the two groups [2, 7, 9, 11]. The result of this study was also different from the study carried out in University Hospital of Caen, France were younger mothers aged less than 19 years had significantly decreased risks of post-partum hemorrhage compared to control mothers ($p<0.05$) [12].

In this study perennial laceration was found to be significantly lower among teenagers (2.1%) compared to adults (11.1%) ($OR: 6.288; 95\% CI: 1.879-21.049$). This was a similar finding to study conducted in a Swedish Medical Birth Register were women with advancing age revealed significantly increased risk of perennial lacerations ($OR: 0.65; 95\% CI: 0.64 - 0.66$) [13]. In contrast to our study, a study done in Cameroon found statistically insignificant difference between the teenage and adult mothers on perennial laceration ($OR: 0.82; 95\% CI: 0.61-1.3$) [2]. The reason for this lower incidence of perennial laceration in teenage mothers could be because teenagers deliver low birth weight babies compared to adults.

Compared to adult mother teenage mothers were having lower preeclampsia/ Eclampsia but this was statically insignificant difference ($OR: 0.286; 95\% CI: 0.035-2.352$). This was inconsistent with studies conducted in Cameroon, Baghdad teaching hospital and Banaras Hindu University of India were preeclampsia / Eclampsia was found to be significantly higher among teenagers ($OR: 3.46; 95\% CI: 1.46 - 8.18$), ($OR: 10.96; 95\% CI: 4.15-35.51$) and ($p<0.01$) respectively [2, 7, 10]. This statistically insignificant difference in our finding could be, because there is no special risk to adolescent mothers of hypertension associated with their young age. However, hypertension is the most common complication of pregnancy amongst women having their first child and is therefore a common complication for many primigravida mothers [14].

In this study preterm delivery was found significantly higher among teenagers (60.40%) compared to adults (16.0%) ($OR: 6.138; 95\% CI: 3.749-10.104$). This finding was similar to studies conducted in Nepal, Cameroon, United State, Nigeria, and Banaras Hindu University of India in which

preterm delivery was found to be significantly higher among teenagers compared to adult mothers ($OR: 1.59; 95\% CI: 1.14-2.20$), ($OR: 1.94; 95\% CI: 1.34 - 2.79$), ($RR: 1.20; 95\% CI: 1.19, 1.20$), ($P=0.000$) and ($p<0.01$) respectively [2, 8, 10, 11, 15]. It was also consistent to a study conducted in Benin, Gabon, Mozambique and Tanzania were preterm delivery was found to be highly associated with young maternal age ($OR: 4.28; 95\% CI: 2.05 - 8.93$) compared to the adult group [16]. Our finding was inconsistent with a study conducted in institute of medical science of India were preterm delivery was found to be statistically insignificant in teenage mothers ($P=0.762$) [9]. This significantly higher result of preterm delivery we found could be, because of immaturity of the uterine or cervical blood supply in teenage pregnancy which in turn could increase the risk of subclinical infection and prostaglandin production, and lead to increased risk of pre-term delivery [9].

According to this study low birth weight babies were found significantly higher among teenage mothers (49.3%) compared to (8.6%) adults ($OR: 0.094; 95\% CI: 0.055 - 0.161$). This result was consistent to studies conducted in Nepal, United States, Cameroon, Nigeria, and in Banaras Hindu University were low birth weight was found to be significantly higher among teenage mothers ($OR: 1.54; 95\% CI: 1.18-2.02$), ($RR: 14; 95\% CI: 1.13-1.14$), ($OR: 1.98; 95\% CI: 1.39 - 2.46$), ($p=0.000$) and ($p<0.01$) respectively [11, 15, 2, 8, 10]. Our result was inconsistent with study done in Shadan institute of medical sciences in India were low birth weight was found to be statistically insignificant among teenage mothers ($p=0.153$) [9]. Findings of our study were also different from a study conducted in Benin, Gabon, Mozambique and Tanzania were low birth weight was not statistically significant ($OR: 1.29; 95\% CI: 0.82 -2.01$) [16]. Several reasons have been discussed in the scientific literature, for the high risk of delivering low birth weight infant by adolescent mothers. Among others include anatomic immaturity and continued maternal growth which may represent biologic growth barriers for the fetus, this could explain the higher number of low birth weight infants among teenagers in our finding [16].

Compared to adult mothers (11.1%) teenage mothers (44.4%) have significantly higher abnormal delivery ($OR: 6.356; 95\% CI: 3.862-10.460$). Our finding was consistent to studies conducted in Baghdad teaching hospital and Niger Delta University were abnormal delivery was significantly higher among teenagers ($OR: 2.13; 95\% CI: 1.2-3.85$) and ($p=0.014$) respectively [7, 8]. In contrast to our finding, a study carried out in the Yaoundé General Hospital of Cameroon, found out statistically insignificant difference between teenagers and adult mothers regarding type of delivery ($OR: 1.07; 95\% CI: 0.733-1, 55$) [2]. Our finding was also different from study conducted in Nepal were abnormal delivery was significantly lower among teenagers compared to adults ($OR: 0.69; 95\% CI: 0.51-0.91$) [11]. In our finding CPD as indication of abnormal delivery was significantly higher among teenagers (80%) compared to adults (20%) ($p=0.000$). This increased indication of CPD

could be because of the fully immature pelvis of the young mother compared to adults.

Low Apgar score at 5th minutes was found lower among teenagers (4.2%) compared to adults (5%) but this was statistically insignificant (*OR*: 1.214; 95% *CI*: 0.455-3.234). This was similar to studies done in Nepal, Shadan institute of medical science India, and Cameroon where Low Apgar score at 5th min was statistically insignificant (*OR*: 1.07; 95% *CI*: 0.82-1.38), ($p=1.00$) and ($p>0.05$) respectively [11, 9, 2]. In contrary to our finding the studies done in Niger Delta University and United States found low Apgar score at 5 minute was higher among teenagers ($p=0.000$) and (*RR*: 1.02; 95% *CI*: 1.01- 1.040.) respectively [8].

5. Conclusion

Controlling marital status, economic status, circumcision, educational level and family support the results of this study suggested that adolescent pregnancy was associated with an increased risk of anemia, preterm birth, low birth weight, abnormal delivery and post-partum hemorrhage. However, preeclampsia and Apgar score were not significantly different between adolescents and adult mothers. Anemia, postpartum hemorrhage, preterm birth and low birth weight were found 2, 0.13, 6 and 0,094 times more among teenagers compared to adults. Abnormal delivery was 6 times more among teenagers. However perennal laceration was 6 times more among adults compared to teenagers.

We conclude that teenage pregnancy before the age of 20 years is associated with increased incidence of adverse maternal and fetal outcome, and we are in favor of the accepted opinion that adverse birth outcome associated with teenage pregnancy is attributable to biological immaturity rather than low socioeconomic status, and inadequate prenatal care.

Limitation of the Study

Only mothers who were having telephone number and residents of Asmara were included in the study. Also, economic status was categorized based on monthly income and monthly expense for house payment only.

Abbreviations

ACHS: Asmara College of Health Sciences; MOH: Ministry of Health; WHO: World Health Organization, SPSS: Statistical Package Social Science, CPD: Cephalo-Pelvic Disproportion; ERM: Early Rupture of Membrane, SVD: Spontaneous Vaginal Delivery

Declarations

Ethics Approval and Consent to Participate

Ethical approval for this study was granted by Asmara College of Health Sciences research ethical approval committee.

In addition, after brief explanation of the purpose of the study, written consent was obtained from the study participants and those who volunteered and participated in the study.

Consent for Publication

This manuscript has not been published elsewhere and is not under consideration by another journal. All authors have approved the final manuscript and agreed for its publication.

Availability of Data and Materials

The complete data set supporting the conclusions of this article is available from the corresponding author and can be accessed up on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

FHG, DTA, EHB, HAT, LST, RSW, SST and SMG participated in the study design and data collection and analysis. FHG, DTA and NKG participated in the study design and helped in drafting article preparation for publication and critically reviewed the manuscript for intellectual content. All authors have read and approved the final manuscript.

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