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Original Research Article

Adverse Health Outcomes of Neonates Born to Adolescent Mothers in Hilla City Babylon Province, Iraq.

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Abstract
Babylon Governorate is the fifth most densely populated governorate in Iraq and has undergone significant demographic changes over the proceeding decades viz. the regression of the age of females who marry very early in adolescence. This trend has impacted the neonatal health of their offspring in the region. There is mounting evidence that this is linked to adverse neonatal outcomes including intrauterine retardation of fetal growth, premature birth, weight which is inappropriate for gestational age, and neonatal morbidity manifested by such illnesses as respiratory distress syndrome (RDS), hemolysis, neonatal jaundice and sepsis. This descriptive cross sectional study, therefore was done aiming to observe the adverse outcomes of neonates born to adolescent mothers (10-19) years in Al-Hilla city, Babylon Province and to elucidate whether under- age child birth impacts neonatal outcome. The study found that pregnancy in adolescence is associated with high rates of dangerous and adverse neonatal outcomes. The mean and standard deviation of current maternal age and maternal age at marriage (year) were (17.54±1.96), (15.46±2.11) respectively, the mean birth weight of neonates born to adolescent mothers was 2659.75±630.1 and the mean gestational age of neonates at birth was 37.22±2.18.There was a significantly increased risk of LBW (33%), preterm birth (28.5%), neonatal jaundice (31.5%), admission to NICU/SCBU was (54.0%), RCU (3.0%) and general hospital wards (13.0%).

Key Words: Respiratory distress syndrome, Adolescent, Mothers.

الخلاصة
هي دراسة وصفية مستعرضة مستندة إلى المستشفى والتي أجريت على عينة قصدية مكونة من (٢٠٠) متطوعة من الامهات المراهقات اللاتي أنجبن في سن تتراوح بين (١٠–١٩) سنة اللاتي كنّ في وحدة العناية المركزة لحديثي الولادة و وحدة العناية الخاصة بالطفل في أربعة مستشفيات في محافظة بابل، وقد أجريت الدراسة على مدى خمسة أشهر بدءا من الخامس عشر من مارس إلى الخامس عشر من أغسطس ٢٠١٧. وتم الحصول على موافقة شفهية من كل أم. وقد جمعت البيانات من خلال إجراء مقابلات مع المشاركات باستخدام استبيان منظم يحتوي على معلومات عن العوامل الاجتماعية الديموغرافية للأمهات وتاريخ الولادة، ومتغيرات حديثي الولادة، ونتائج حديثي الولادة وأسباب دخولهم المستشفى.
وجدت الدراسة ان المتوسط والانحراف المعياري لعمر الأم الحالي وعمر الأم عند الزواج (سنة) (١٧,٥٤ ± ١,٩٦)، (١٥,٤٦ ± ٢,١١) على التوالي، كان متوسط وزن الولادة لحديثي الولادة المولودين للأمهات المراهقات ٢٦٥٩,٧٥ ± ٦٣٠,١ ومتوسط عمر الحمل من المولودين عند الولادة ٣٧,٢٢ ± ٢,١٨. كانت هناك زيادة معنوية فيخطر الإصابة بنقصان الوزن عند الولادة (٣٣٪) والولادة المبكرة (٢٨,٥٪) واليرقان الوليدي (٣١,٥٪)، وبلغت نسبة الرقود في وحدة العناية المركزة لحديثي الولادة/ وحدة العناية الخاصة بالطفل (٥٤,٠٪)، ووحدة العناية التنفسية (٣,٠٪)، وأجنحة المستشفى العامة (١٣,٠٪).

الكلمات المفتاحية: الأمهات المراهقات، الولادة المبكرة.

Introduction
Globally 11% of all births are to females aged 15-19 years, and almost all of these births are recorded in low income and middle income countries. Girls are getting pregnant as young as 10 years, thus teenage pregnancy can be defined as pregnancy in females aged ten to nineteen years [1]. Adolescent pregnancy is a major community health problem internationally which has for a long time been regarded a high-risk health hazard [2].

Materials and Methods:
Study Design:
This is a cross sectional study which was conducted in Babylon Maternity and Paediatrics Hospital, Hilla General Teaching

Hospital, Imam Sadiq General Hospital and Al-Noor Paediatric Hospital. The collection of data for this study was collected over a period of five months beginning from the fifteenth of March to the fifteenth of August 2017.

Study Population:

This study included a convenient sample of 200 neonates of adolescent mothers who gave birth at an age between (10-19) years who were cared for in the NICU, SCBU, general wards and emergency units and who were brought to specialist day clinics at the four aforementioned hospitals who agreed to participate in this study. Analysis of data was done utilizing SPSS version 22 computer software.

Results:

Table 1 shows that the current maternal age of the adolescent mothers is 17.54±1.96 and that the mean maternal age at marriage is 15.46±2.11. Fig 1 shows that more than two third of adolescents have a child in the late adolescent period (17-19) years, while the other third become mothers in earlier stages of adolescence (10-12) years (10%), and (13-16) years (22%) respectively.

Table (1): Mean and standard deviation of current maternal age (year), maternal age at marriage (year) of the mothers who participated in the study.

Variables	Mean±SD	Range
Current maternal age (year)	17.54±1.96	(10-19)
Maternal age at marriage (year)	15.46±2.11	(10-19)

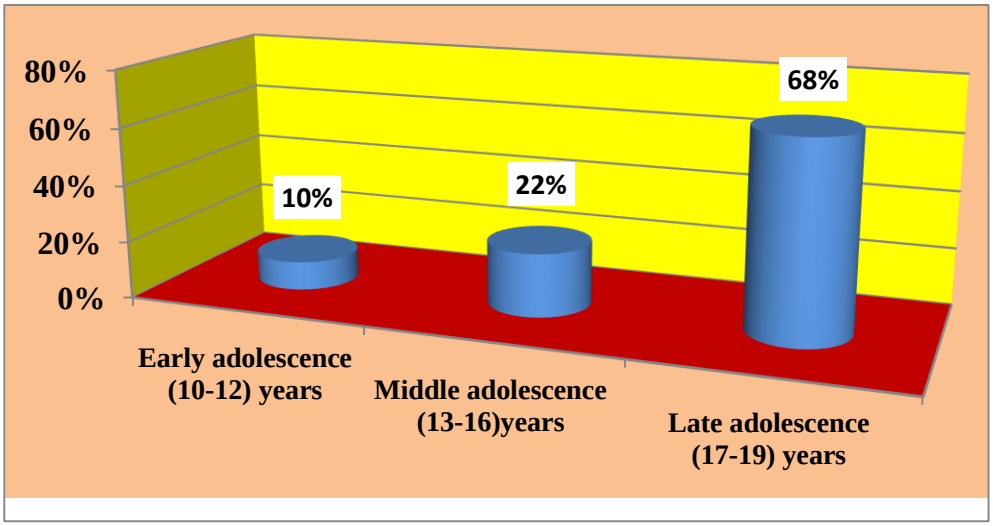


Figure (1): Distribution of adolescence mothers by age.

Table 2 shows that the mean birth weight of neonates born to adolescent mothers is 2659.75±630.1 They tend to be born early, the mean gestational age is 37.22±2.18.

The anthropometric measurements of such neonates is lower than average with the mean head circumference being 34.35±2.23 & the mean length is 46.44±4.05.

Table 3 shows that 69% of respondent mothers either lack any form of education or have an education limited to the primary level. The balance of residence being rural or urban tips more to the rural side (53%). Almost all respondent mothers are housewives (97.5%). Not all the mothers are currently married in the study, 14% of them are either separated/ divorced or widowed. Over half of the respondents are part of a consanguine marriage.

Table (2): Mean and standard deviation of birth weight (gm), gestational age (weeks), head circumference (cm) and length (cm) of the neonates born to adolescent mothers.

Variables	Mean ±SD	Range
Birth weight(gm)	2659.75±630.1	(1000-4500)
Gestational age (Weeks)	37.22±2.18	(28-42)
Head circumference (cm)	34.35±2.23	(30-37)
Length (cm)	46.44±4.05	(40-53)

Table (3): Distribution of adolescent mothers by socio-demographic characteristics (N=200).

Variables	No.	(%)
Maternal education		
Illiterate	36	18.0%
Primary education	102	51.0%
Secondary education	47	23.5%
Higher education	15	7.5%
Total	200	100.0%
Residence		
Rural	106	53.0%
Urban	94	47.0%
Total	200	100.0%
Employment		
Employed	5	2.5%
House wife	195	97.5%
Total	200	100.0%
Marital status		
Married	172	86.0%
Separated/divorce	14	7.0%
Widow	14	7.0%
Total	200	100.0%
Consanguinity		
Consanguine	119	59.5%
Non consanguine	81	40.5%
Total	200	100.0%
Husband previously married		
Yes	14	7.0%
No	186	93.0%
Total	200	100.0%
Cigarettes smoking		
Yes	0	0.0%
No	200	100.0%
Total	200	100.0%

Table 4 shows that 41.5% of the adolescent mothers already have more than one baby, and they tend to give birth via normal vaginal delivery (66.5%), although one tenth end up having an emergency caesarian section (11.5%). Nine out of ten adolescent women report giving birth in hospitals. Adolescent mothers tend to be fertile and thus two fifths of them have another pregnancy within 2 years or less from the previous one (close spacing) which represents 40.0%. Regarding ANC 66.0% of respondents lack ANC or tend to have irregular visits, and because of this 39% have no history of taking tetanus toxoid vaccine, and 21.5% receive no iron

supplementation at all during pregnancy.

Table (4): Distribution of adolescent mothers by obstetrical Characteristics.

Variables	No.	(%)
Gravida		
Primi	117	58.5%
Multi	83	41.5%
Total	200	100.0%
Type of delivery		
Normal vaginal delivery	133	66.5%
Elective C-section	44	22.0%
Emergency C-section	23	11.5%
Total	200	100.0%
Place of delivery		
Institutional	189	94.5%
Home	11	5.5%
Total	200	100.0%
Close spacing (years)		
Yes	80	40.0%
No	120	60.0%
Total	200	100.0%
Stillbirth		
Positive	18	9.0%
Negative	182	91.0%
Total	200	100.0%
Antenatal care		
Regular	68	34.0%
Irregular	88	44.0%
Not at all	44	22.0%
Total	200	100.0%
Tetanus toxoid		
Yes	122	61.0%
No	78	39.0%
Total	200	100.0%
Iron supplementation		
Yes	157	78.5%
No	43	21.5%
Total	200	100.0%

Table 5 shows that a high percentage of neonates born to adolescent mothers are not discharged home but need critical care in NICU/ SCBU (54%), RCU (3%) and general hospital wards (13%). Table 6 shows that 93.5% of neonates are hospitalized for a duration of up to 7 days after birth and in such cases (41%) of them are separated from the mothers, but breast feeding is feasible during hospitalization in 78%.

Table (5): Distribution of the neonates born to adolescent mothers who were admitted to NICU/SCBU, RCU and hospital wards (N=200).

Variable	Number	Percentage (%)
Admission to NICU/SCBU		
Yes	108	54.0%
No	92	46.0%
Total	200	100.0%
Admission to RCU		
Yes	6	3.0%
No	194	97.0%
Total	200	100.0%
Admission to general hospital wards		
Yes	26	13.0%
No	174	87.0%
Total	200	100.0%

Table (6): Distribution of the neonates by duration of hospitalization, separation from mothers and breast feeding during hospitalization (N=200).

Variable	No.	(%)
Duration of hospitalization (day)		
0- 7	187	93.5%
8-14	9	4.5%
More than 14	4	2.0%
Total	**200**	**100.0%**
Separations from mothers		
Yes	82	41.0%
No	118	59.0%
Total	**200**	**100.0%**
Breast feeding during hospitalization		
Yes	156	78.0%
No	44	22.0%
Total	**200**	**100.0%**

Table 7 shows that the reasons for hospitalization of neonates born to adolescent mothers in order of frequency include problems of prematurity & LBW including RDS and TTN which represents 44.5%, followed by jaundice 31.5%.The rest of the neonates (24%) include congenital malformations/ dysmorphism, birth asphyxia and or seizure, septicemia and hemolytic disease of newborn. Fig 2 shows that low birth weight represents 33% of all neonates born to adolescent mothers.

Fig 3 shows that only 58% of neonates have weight appropriate for gestational age, while 30% are small for gestational age.

Table (7): Distribution of the reasons of the hospitalization of neonates born to adolescent mothers.

Variable	No.	(%)
Prematurity and LBW&/or RDS and TTN	89	44.5%
Jaundice	63	31.5%
Birth asphyxia &/or seizure	15	7.5%
Septicemia	12	6.0%
Hemolytic disease of newborn	2	1.0%
Congenital malformation/dysmorphism	19	9.5%
Total	200	100.00 %

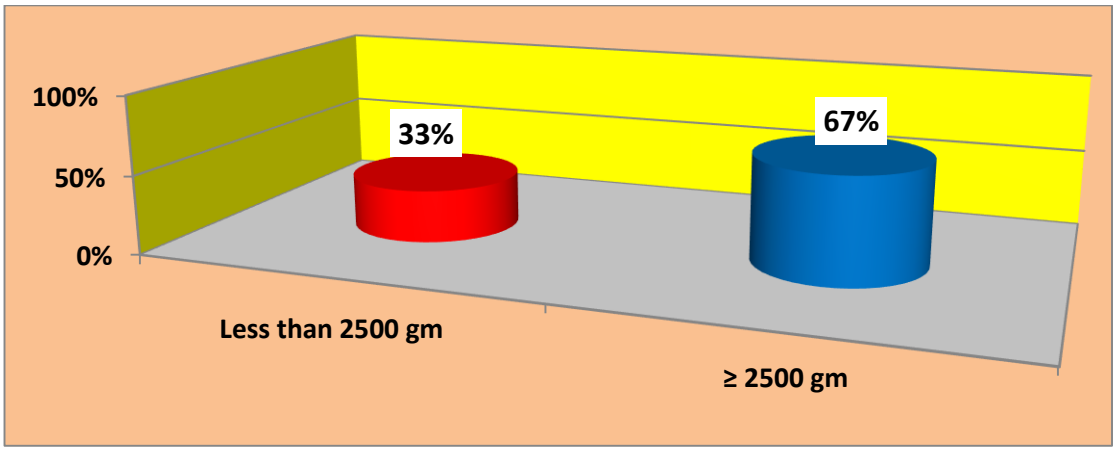
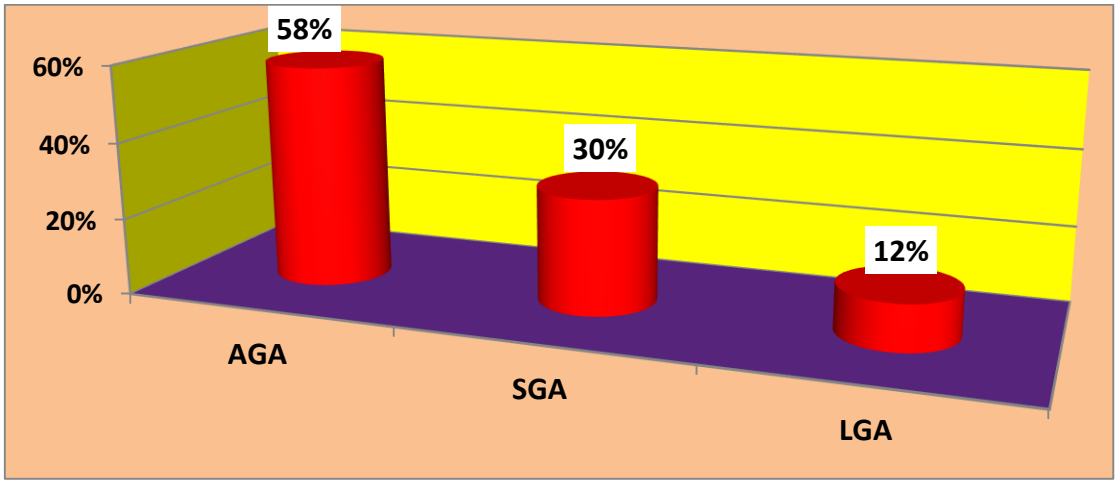


Figure (2): Distribution of the neonates by birth weight.



*AGA: Appropriate for gestational age **SGA: Small for gestational age ***LGA: Large for gestational age

Figure (4): Distribution of the neonates by maturity.

Table 8 shows that an ANOVA test was conducted to determine if differences existed between the mean birth weight and gestational age of the neonates with the age of adolescent mothers (early, middle or late adolescent).

There is a significant mean difference between birth weight and age of adolescent mothers (p =0.046, F= 3.133). Table 9 chi square test was conducted to show the association between maternal socio-demographic factors and the age of adolescent mothers.

There is a significant association between residence, educational level with the age of mothers (early, middle or late adolescent), P value = 0.008, < 0.001 respectively).

Table (8): Mean difference of birth weight and gestational age according to the age of adolescent mothers (N=200).

Variable	Maternal age(year)	N	Mean ±SD	ANOVA	P-value
Birth weight(gm)	Early adolescence (10-12)	20	2625±589.04	3.133	0.046*
	Middle adolescence(13-16)	44	2460.23±596.07		
	Late adolescence(17-19)	136	2729.41±636.55		
	Total	200			
Gestational age(weeks)	Early adolescence (10-12)	20	37.1±1.83	1.292	0.277
	Middle adolescence (13-16)	44	36.77±2.29		
	Late adolescence (17-19)	136	37.38±2.19		
	Total	200			

Table (9): Association between maternal socio-demographic factors and age of adolescent mothers (N=200).

Variables	Maternal age(year)			Total	X^2	P value
	Early adolescence (10-12)	Middle adolescence (13-16)	Late adolescence (17-19)			
Residence					9.537	0.008*
Rural	13(65.0%)	31(70.5%)		106(53.0%)		
Urban	62(45.6%)7(35.0%)13(29.5%)		74(54.4%)	94(47.0%)		
Total	20(100.0%)	44(100.0%)	136(100.0%)	200(100.0%)		
Educational level						<0.001*[f]
Illiterate	7(35.0%)	14(31.8%)	15(11.0%)	36(18.0%)		
Primary	13(65.0%)	24(54.5%)	65(47.8%)	102(51.0%)		
Secondary	0(0.0%)	4(9.1%)	43(31.6%)	47(23.5%)		
Higher education	0(0.0%)	2(4.5%)	13(9.6%)	15(7.5%)		
Total	20(100.0%)	44(100.0%)	136(100.0%)	200(100.0%)		
Employment						0.468
Employed	0(0.0%)	0(0.0%)	5(3.7%)	5(2.5%)		
House wife	20(100.0%)	44(100.0%)	131(96.3%)	195(97.5%)		
Total	20(100.0%)	44(100.0%)	136(100.0%)	200(100.0%)		
Consanguinity					2.238	0.327
Consanguine	10(50.0%)	30(68.2%)	79(58.1%)	119(59.5%)		
Non consanguine	10(50.0%)	14(31.8%)	57(41.9%)	81(40.5%)		
Total	20(100.0%)	44(100.0%)	136(100.0%)	200(100.0%)		

*P value≤ 0.05 was significant; F: fisher-exact test.

Table 10 Fisher exact test was conducted as shown in table 10 to show the association between reason of hospitalization of neonates born to adolescent mothers and age of adolescent mothers, there is a significant association P value = 0.056.

Table 11 shows that chi square test was conducted to show the association between type of feeding, duration of hospitalization, rate of stillbirth and gravida with the age of mothers.

There is a significant association between (duration of hospitalization, rate of stillbirth and gravida) with the age of the mothers, (P value 0.01, 0.015 and 0.031 respectively).

Table (10): Association between reason of neonatal hospitalization and age of adolescent mothers (N=200).

Reasons of hospitalization	Maternal age (year)			Total	P value
	Early adolescence (10-12)	Middle adolescence (13-16)	Late adolescence (17-19)		
Prematurity and LBW&/or RDS and TTN	8(40.0%)	18(40.9%)	63(46.3%)	89(44.5%)	0.056*[f]
Jaundice	9(45.0%)	12(27.3%)	42(30.9%)	63(31.5%)	
Birth asphyxia &/or seizure	0(0.0%)	3(6.8%)	12(8.8%)	15(7.5%)	
Septicemia				12(6.0%)	
Hemolytic disease of newborn	2(10.0%)	7(15.9%)	3(2.2%)		
Congenital malformation/dysmorphism	0(0.0%)	0(0.0%)	2(1.5%)	2(1.0%)	
Total	1(5.0%)	4(9.1%)	14(10.3%)		
	20(100.0%)	44(100.0%)	136(100.0%)	19(9.5%)	
				200(100.0%)	

Table (11): Association between type of feeding, duration of hospitalization and rate of still birth and age of adolescent mothers (N=200).

Variables	Maternal age(year)			Total	X^2	P value
	Early adolescence (10-12)	Middle adolescence (13-16)	Late adolescence (17-19)			
Type of feeding					1.454	0.5
Breast feeding	14(70.0%)	32(72.7%)	108(79.4%)	154(77.0%)		
Artificial feeding	6(30.0%)	12(27.3%)	28(20.6%)	46(23.0%)		
Total	20(100.0%)	44(100.0%)	136(100.0%)	200(100.0%)		
Duration of hospitalization (day)						0.01*
0-7	19(95.0%)	36(81.8%)	132(97.1%)	187(93.5%)		
8-14	1(5.0%)	5(11.4%)	3(2.2%)	9(4.5%)		
More than 14	0(0.0%)	3(6.8%)	1(0.7%)	4(2.0%)		
Total	20(100.0%)	44(100.0%)	136(100.0%)	200(100.0%)		
Stillbirth						0.015*
Positive	3(15.0%)	8(18.2%)	7(5.1%)	18(9.0%)		
Negative	17(85.0%)	36(81.8%)	129(94.9%)	182(91.0%)		
Total	20(100.0%)	44(100.0%)	136(100.0%)	200(100.0%)		
Gravida					6.977	0.031*
Primi	14(70.0%)	32(72.7%)	71(52.2%)	117(58.5%)		
Multi	6(30.0%)	12(27.3%)	65(47.8%)	83(41.5%)		
Total	20(100.0%)	44(100.0%)	136(100.0%)	200(100.0%)		

Discussion:

Teenage pregnancy is often correlated with adverse reproductive outcomes (especially preterm birth), increased risk of neonatal mortality, and intrauterine growth restriction, although some studies have not confirmed these adverse effects particularly following adequate prenatal care [3]. The present study showed that the mean birth weight of neonates born to adolescent mothers is 2659.75±630.1 They tend to be born early, the mean gestational age is 37.22±2.18. This agreed with study in Iraq which found that the mean neonatal birth weight of adolescent mothers is 2.8kg (±0.42) [4]. The anthropometric measurements of such neonates is lower than average with the mean head circumference being 34.35±2.23 & the mean length is 46.44±4.05. The head circumference may be influenced by gestational age at birth and birth weight. Head circumference could also be determined by hydrocephalus, SGA, or large for gestational age (LGA) babies.

In this present study, we found that 18 (9%) were stillbirths, whereas study in India found that 30 (4.91%) were stillbirths [5].

The current study showed that a high percentage of neonates born to adolescent mothers are not discharged home but need critical care in NICU/SCBU (54.0%), RCU (3.0%) and general hospital wards (13.0%). This agreed with study in Iraq which found that the rates of neonatal admission were (56.5%) [4]. Whereas study in Egypt found that admission to NICU were (37.2%) [6]. And this agreed with study reported in Jordan [7, 8].

The present study showed that the reasons for hospitalization of neonates born to adolescent mothers in order of frequency include problems of prematurity and LBW including RDS and TTN which represents 44.5%, followed by jaundice 31.5%. The rest of the neonates (24%) had medical problems related to congenital malformations/ dysmorphism, birth asphyxia and or seizures, septicemia and hemolytic disease of new born. LBW in our study represented (33%) of all neonates born to adolescent mothers. This is in agreement

with study in Iran which found that (32%) of neonates were LBW [9]. Higher rates for low birth weight (LBW) have been reported from Nigeria, Taiwan, Saudi Arabia, Brazil, but not necessarily in combination with higher rate for prematurity [10-13]. Most studies reported that adolescent girls had a significantly higher incidence in LBW than that in the adult mothers [8, 14, 15, 16]. Numerous studies found a link between adolescent pregnancy and LBW babies. Our study found that early adolescent mothers (10-12) years had neonates with mean birth weight of 2625±589. This agreed with a report which found that very young girls (10-12) have more LBW infants, in comparison to fifteen years old [20]. The present study showed that (28.5%) of neonates were born preterm, and showed that middle adolescent mothers (13-16) years get birth to neonates at a mean gestational age of 36.77±2.29, this is in agreement with a study which found a various adverse outcome including premature labour in a number of teenage women under fifteen years old [21].

Various studies carried out in different regions of the world revealed preterm birth to be the most common complication as reported to be 13.2%, 10.56% and 48% [22, 23, 24]. Many reports from both advanced and less developed nations have continuously documents that pregnant girls tend to have more LBW in comparison [25, 26, 27], preterm delivery [20, 28, 29] and with the risk of associated long term health hazards [30, 31]. Research from Thailand also reported that teenage pregnancies were associated with higher risks of preterm deliveries [19]. Premature delivery was also indicated as a risk factor in numerous research studies in the adolescent group [18, 19, 32]. The increased risk of premature rupture of membranes and preterm labor has been attributed to shortness of the cervix or biologic immaturity of the uterus with subsequent increased risk of ascending infection [3].

The present study showed that pathological jaundice among neonates of adolescent mothers occurred in (31.5%), whereas study in Nepal showed that the rate was (0.6%) [33].

Conclusions:

Preterm labor and low birth weight are major adverse neonatal outcomes since these tend to be more common among teenage pregnancies and both are compounded by associated medical problems especially pathological jaundice.

A high percentage of neonates born to adolescent mothers are not discharged home but need critical care instead, whether in NICU/SCBU, RCU or general hospital wards.

Neonates of adolescent mothers are hospitalized on average for a duration of up to (7) days after birth because of their complex medical needs.

Adolescent mothers tend to be more fertile than other age groups of mothers and thus two fifths of them have another pregnancy within 2 years or less from the previous one (close spacing) and a high percentage of them lack ANC or pay irregular visits.

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