MATERNAL AGE AND PREGNANCY OUTCOMES

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Abstract

Background: pregnancy and childbirth at extreme maternal age is associated with an increased risk of adverse maternal fetal and newborn outcomes. **The aim:** the aim of this study was to assess the relationship between maternal age and pregnancy outcomes. **Methods:** this study adopts a descriptive comparative hospital-based study design. It was conducted at three selected hospitals. A cluster number of 585 women were selected randomly to participate in this study. The participant pregnant women were divided according to their age into three groups. The relevant data were collected using three tools, namely: a structured interview questionnaire, maternal-obstetrical complications and newborn health assessment scales. The data were analyzed using descriptive and inferential statistical tests. **Results:** In the current study, (OR = 4.16) and (OR = 0.284) were reported as complications of pregnancy (hypertension and diabetes), in group one in comparison with the reference group respectively. In group three, pregnancy complications such as intrauterine retardation, hypertension, diabetes and abortion in comparison with the reference group (OR =, 2.79, 4.02 & 2.16) respectively. Concerning association, there was no relationship between group one, intrauterine retardation and abortion. On the other hand, there was highly statistically significant association between group one, hypertension and diabetes (P-value =0.000). In group three there was highly statistically significant correlation between this group and all complications of pregnancy (P-value = 0.000). Regarding newborns' health, there was statistical correlation between hypoxia and group one and three as compared to the reference group (OR= 0.0416 & 1.3100) consecutively, and there was statistically significant association between group one, three in comparison with the reference group (P-value= 0.000). **Conclusion:** the study concluded that maternal age is one of the independent risk factors for adverse pregnancy outcome.

Keywords: Maternal Age, Pregnancy Complications, Pregnancy Outcome

INTRODUCTION

About 16 million women aged between 15- and 19-years old give birth each year, representing about 11% of all births worldwide. Ninety-five percent (95%) of these births occur in low- and middle-income countries [1]. The youngest mothers (16 years) had substantially higher risks for maternal and prenatal morbidity and mortality than the late adolescence age group (16-19 years), especially if they live in a developing country [2].

Data suggest that pregnant teenagers are more likely than adult women to suffer adverse

medical and obstetric outcomes, such as hypertensive disease, anemia, infection, and depression during pregnancy [3]. Data from previous literature also showed higher incidence of caesarean section [4] and operative vaginal delivery (both vacuum and forceps extraction) [5]. Furthermore, they may continue to have consequences, like depression later in life, delayed or discontinued education, or increased utilization of public assistance [6].

The impact of AMA and parity on pregnancy outcome has become increasingly important. Traditionally, these advanced maternal age women are considered to have higher incidence of obstetric complications and adverse pregnancy outcomes than younger pregnant women [7]. Some disagreement still exists in the literature on the pregnancy outcomes at advanced maternal age. Some researchers, [8, 9] have suggested compromised pregnancy outcome while others [7, 10] have reported similar outcomes.

AMA is considered to be among the risky pregnancies; as of 2009, 14% of all the children were born by 35 years and older mothers [11]. Pregnancies of high risk have increased mortality and morbidity for both mother and fetus during birth [12].

Prolonged education, career priority, fertility control through effective contraceptive methods, heavy working conditions and economic problems lead to a postponed pregnancy age.

AMA beyond 35 years is considered to have more adverse pregnancy outcomes as compared to those in younger women [13]. For the management of pregnant women with age > 35 years, it requires an understanding of the effect of age, pre-existing co-morbidities which may lead to complications during pregnancy, delivery and thus prevent a healthy outcome [14]. Any pregnancy at more than 35 years of age is always at increased risk for outcome complications such as diabetes, pregnancy-induced hypertension, anemia, ante-partum hemorrhage, and post-partum hemorrhage, mode of delivery, preterm birth, intrauterine growth restriction and increased rate of caesarean section. The prenatal morbidity like low birth weight and birth asphyxia as well as prenatal mortality is increased in these women as compared to their younger counterparts [15]. In the developed world, the changing pattern of becoming pregnant at an advanced age can be attributed to various reasons. The main reasons could be changes in the structure of family with more late marriages or remarriages, women's pursuit of higher education, carrier advancement, and advances in assisted reproductive technique and availability of effective and safe contraceptives [7, 10]. In developing countries e.g., Nepal, the scenario is different. The women tend to become pregnant at advanced age due to concept of large family size, sometimes desire for male child and moreover due to lack of knowledge of availability of effective contraception. It is well established that advanced maternal age is associated with sub-fertility, chromosomal abnormalities, and multiple gestation [9, 12]. A large body of literature exists describing the impact of advanced maternal age on maternal and fetal outcomes [10, 16]. Unfortunately, the data are conflicting. Although a number of studies found an association between delaying child birth and adverse maternal and fetal outcomes, [10, 12, 16], other studies challenge these findings [17].

RESEARCH METHODOLOGY

This is a descriptive comparative study conducted at three governmental hospitals in Khartoum state, Sudan, namely: Soba University Hospital, Omdurman Maternity Hospital and Khartoum North Teaching Hospital. The participants of the study were 585 pregnant mothers with singleton deliveries attended to the selected hospitals in labor room for delivery, and they were divided into three groups: the first group included pregnant women who were younger less than 20 years; the second group included pregnant women between 20–35 years; and the third group included pregnant women older than 35 years.

The simple random sampling method was used to select the study sample. A self-administered structured questionnaire was used to collect the required data from the sample. The questionnaire contained three sections: (1) demographic profile (age at marriage, gravity, parity), (2) data about obstetric condition and labor complications and newborn health were obtained by interview from the women who fulfilled the criteria of parameters in the labor room. The collected data were entered, coded, and analyzed using univariate and bivariate analysis in SPSS (Statistical Package for Social Sciences), Version 25. Frequency analysis, cross-tabulation, and inferential statistics were used as multinomial logistic regression analysis and the result by odd ratio confidence interval 95%. Manual revision was used to detect any errors. The results were presented in frequency tables, figures, and cross-tabulations. The significance test was carried out using the Chi-Square test, with a significance level of 0.05. Prior to the start of the study, ethical approval was obtained from the Ethical Committee of the Higher Education and Scientific Research Board of the University of Khartoum. Verbal consents were obtained from the participants. All participants were ensured anonymity, confidentiality, and their privacy and dignity were protected. Participants had the right to refuse to answer any question.

RESULTS

Table 1: Distribution of the studied groups according to their obstetrical data (N =585)

Items	Group1 < 20 years	Group 2 20 - 35 years	Group3 > 35 years	P. Value
Age at marriage				
<20 years	195 (100%)	71 (36. 4%)	23 (11. 8%)	
20- 35	0(0%)	124(63. 6%)	142(72. 8%)	
>35	0(0%)	0 (0%)	30(15.4%)	
Mean ± SD	16± 1.45	21.36± 4.1	29.3± 6.7	
Gravidity				
Primi-Gravida (1)	122(62%)	51 (26. 2%)	34 (17. 4%)	
Multi-Gravida (2-5)	73 (37. 4%)	125(64. 1%)	120(61. 5%)	
Grand multi-Gravida>5	0(0%)	19(9. 7%)	41 (21. 0%)	
Parity				
Primi-Para(1)	157(80. 5%)	64 (32. 8%)	51 (26. 2%)	
Multi-Para (2-5)	38 (19.5%)	123(63.1%)	130(66. 7%)	
Grand multi-Para (>5)	0(0%)	8(4. 1%)	14(7. 2%)	

Table 2: Multinomial logistic regression estimates for the type of complication during pregnancy (n=585)

Complications appear during current pregnancy [a]		Coefficient B	Std. Error	P-Value	OR	95% Confidence Interval for Exp (B)	
						Lower Bound	Upper Bound
Malaria		-2.378	.279	.000			
	Age < 20 yrs	-.903	.534	.091	.405	.142	1.156
	Age > 35 yrs	-.123	.432	.775	.884	.379	2.060
	Age 20 -35 yrs	0[b]					
IUGR		-21.767	.315	0.000			
	Age < 20 yrs	.100	4394.850	1.000	1.105	0.000	.[c]
	Age > 35 yrs	19.361	0.0001	0.000	256048632.73	256048632.73	256048632.73
	Age 20 -35 yrs	0[b]					
HTN		-2.532	.300	.000			
	Age < 20 yrs	1.426	.347	.000	4.163	2.110	8.213
	Age > 35 yrs	1.024	.368	.005	2.785	1.355	5.725
	Age 20 -35 yrs	0[b]					
DM		-3.631	.507	.000			
	Age < 20 yrs	-1.259	1.124	.263	.284	.031	2.571
	Age > 35 yrs	1.392	.585	.017	4.023	1.279	12.650
	Age 20 -35 yrs	0[b]					
Deep vein thrombosis		-4.324	.712	.000			
	Age < 20 yrs	-18.642	8415.497	.998	8.016E-09	0.000	.[c]
	Age > 35 yrs	-.480	1.231	.697	.619	.055	6.906
	Age 20 -35 yrs	0[b]					
Ante-partum hemorrhage		-5.017	1.003	.000			
	Age < 20 yrs	1.736	1.102	.115	5.677	.655	49.206
	Age > 35 yrs	-17.258	6221.923	.998	3.197E-08	0.000	.[c]
	Age 20 -35 yrs	0[b]					
Anemia		-2.715	.327	.000			
	Age < 20 yrs	-.230	.507	.650	.795	.294	2.147
	Age > 35 yrs	-.143	.508	.778	.866	.320	2.343
	Age 20 -35 yrs	0[b]					

Chi square = 77.96   with p-value < 0.0001

The Chi square for overall model indicates that overall model is highly significant.

The age 20 - 35 years is set as reference category

Table 3: Logistic regression estimates for complications at labor (n=585)

	B	S.E.	P-Value	OR	95% C.I. for OR	
					Lower	Upper
Age3			.002			
Age < 20 yrs	-1.224	.586	.037	.294	.093	.928
Age > 35 yrs	.630	.366	.085	1.878	.916	3.850
Gestational age			.377			
Full term	-.602	.432	.163	.548	.235	1.277
Post term	-.579	1.122	.606	.561	.062	5.056
comp_preg1(1)	.461	.341	.177	1.585	.812	3.095
Constant	-2.255	.464	.000	.105		

Chi square = 21.201   with p-Value =0.001

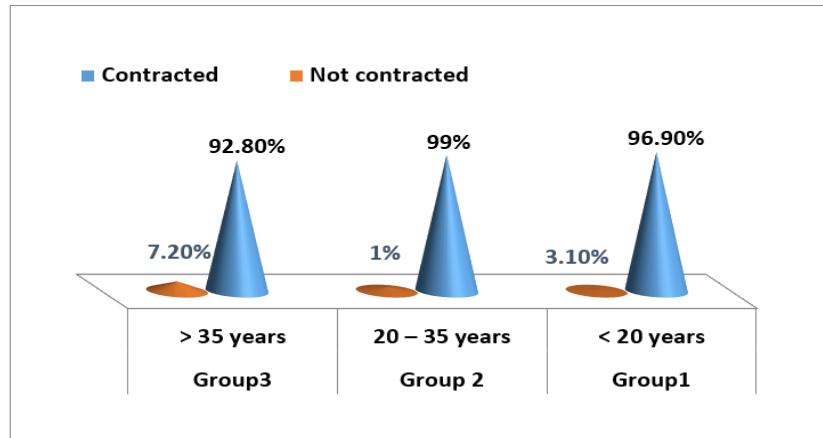The Chi square for overall model is highly significant.

Fig 1: Distribution of the studied groups according to the uterine tone

Figure 1 revealed that a vast majority of women in the age group 20-35 years had contracted uterus after deliveries. Overall, the age groups are similar in this regard.

Table 4: Logistic regression for association between age of mother and fetal outcome (Alive) (n=585)

	B	S.E.	P-value	OR	95% C.I.for OR	
					Lower	Upper
Age3			.027			
Age < 20 yrs	1.091	.486	.025	2.977	1.148	7.723
Age > 35 yrs	.948	.461	. .040	2.579	1.045	6.369
	2.343	.254	.000	10.412		

The variable fetal outcome is coded 0/1 where alive =1 and FSB=0, while MSB and abortion are excluded from analysis because there were very few cases.

There is significant negative association between age <20 years and fetal outcome as a live, women in this age (<20) are 2.58 times more likely to have alive fetus; so the chance for those in the age group<20 years increases as compared to women in the age group 20-35. The age group > 35 years shows significant association with a live fetus, women in age > 35 years are 2.98 times more likely to have a live fetus.

Table 5: Logistic regression for association between age and newborn assessment n= (585)

Dependent	Variable	B	S.E.	P-Value	Odd Ratio	95% C.I. for OR	
						Lower	Upper
Baby cried immediately	Age3			.454			
	Age < 20 yrs	.348	.337	.302	1.417	.731	2.744
	Age > 35 yrs	.263	.333	.430	1.300	.677	2.496
	Constant	2.000	.222	.000	7.391		
Neonatal Asphyxia	Age3						
	Age < 20 yrs	-.877	.438	.045	.416	.176	.981
	Age > 35 yrs	.286	.333	.390	1.331	.693	2.555
	Constant	-2.274	.248	.000	.103		
Newborn distress	Age3						
	Age < 20 yrs	-.011	.459	.981	.989	.402	2.433
	Age > 35 yrs	.704	.405	.082	2.022	.914	4.470
	Constant	-2.907	.325	.000	.055		
Congenital anomalies	Age3						
	Age < 20 yrs	-1.130	.823	.170	.323	.064	1.620
	Age > 35 yrs	-.405	.654	.535	.667	.185	2.401
	Constant	-3.439	.415	.000	.032		
Admission to the neonatal unit	Age3						
	Age < 20 yrs	-.485	.349	.165	.616	.311	1.220
	Age > 35 yrs	.320	.298	.283	1.377	.768	2.471
	Constant	-2.000	.222	.000	.135		

There is no association between the variable 'baby cried immediately' and the age of women >35 years, while there is significant association between age <20 years and neonatal asphyxia. The odd ratio for this variable indicates that women with age <20 years are 0.416 times less likely to have neonatal asphyxia than those in age 20 -35 years; so, we can safely assume that the chance of getting neonatal asphyxia increases with age.

Neonatal distress and congenital anomalies are not significantly associated with age of women. There is also no significant association between age of mothers and admission to the nursery unit.

DISCUSSION

The present study is a descriptive comparative study conducted to determine the relationship between maternal age and pregnancy outcomes. Among the 585 pregnant women enrolled in the study, there were three age groups, namely: the teenage group [<20 years old], the second group [20-35 years old] and the advanced age group [>35 years old]. Considering their age at marriage, the current study showed that the mean age at marriage in group 1 16±4 years, 21.4 ±4.1 in group 2 and 29.3 ±6.7 in group 3

In the present study, the results show that there are main complications which occur during

pregnancy. Regarding IUGR, there is highly significant association in group 3 (OR256048637.72; 95% CI: 25604862.73-256048632.72), while in group 1 there is no significant association in comparison to the reference group (P-value <0.0001). That means the AMA had a higher risk to develop. This result agrees with a result revealed by a study done in the UK which reported a positive dose–response association between increasing maternal age and increasing risk for intrauterine growth restriction. Maternal age greater than 35 and greater than 40 years was independently associated with intrauterine growth restriction, with odds ratios of 1.4 and 3.2, respectively [18].

Another finding of the present study indicated that hypertension disorder among the pregnant women in the selected sample is highly significant in group 1 (OR 4.16; 95% CI: 2.110 – 8.213) and group 3 (OR 2.79; 95% CI 1.355 -5.725) in comparison to the reference group (P-Value <0.000). This particular finding is in disagreement with a result obtained by a study conducted in 2012 in Muar District which found that advanced maternal age was associated with pregnancy-induced hypertension (adjusted odds ratio: 5.00; 95% CI: 1.95-12.65) [19]. This finding agrees with a finding by a study conducted in Sudan which showed that adolescent pregnancy was associated with numerous medical problems, one of which was pregnancy-induced hypertension. Regarding DM, the present study found that there is highly significant association between DM and maternal age. Most of the participants in group 3 had gestational diabetes (OR4.02; 95%, CI: 1.279- 12.659) in comparison to group 1 and the reference group (P-value = 0.000). This finding is in agreement with a finding by a previous study which showed that advanced maternal age was associated with gestational diabetes mellitus (adjusted odds ratio: 2.32; 95% CI: 1.35-4.00) [19].

On the other hand, there is no significant association between gestational ages among the three groups, but there is a smaller number of preterm deliveries in group 1. This specific finding is similar to a finding in a previous study which showed that young mothers can be at risk of preterm delivery [20]. This age group also did not show any increased rate of C/S. This can be a direct effect of preterm labor which results in small babies in proportion to the maternal pelvic bony structure. However, maternal age may exert effect on uterine contraction intensity as Main states that increased maternal age can increase C/S due to failure to progress [20].

Regarding complications during labor, in the present study there is highly significant association with maternal age in group 3 (OR1.878; 95%, CI:.916 – 3.850) and group 1 (OR.294; 95%, CI:.093 - .928) in comparison to the reference group (P-value = 0.001). This shows decreased risk for younger women; women with age < 20 years are 0.294 times less likely to develop complications at labor.

There is significant association between age and fetal outcome as alive in group 1 (OR 2.977; 95%CI: 1.148 – 7. 723) and group 3 (OR.579; 95%, CI: 1.045 -1.0369) in comparison to the reference group (P-value = 0.000). This result is in disagreement with the finding of a study done in Sweden which showed that there was no significant association between advanced maternal age and adverse fetal outcomes [2].

Concerning neonatal asphyxia, there is significant association in group 3 (OR 1.300; 95%,

CI: .677 – 2.496) and group 1 (OR.416; 95% CI:.176 -,981) in comparison to the reference group (P-value = 0.000). On the other hand, there is no association between maternal age and congenital anomalies, respiratory distress and admission to the NICU. The finding about NICU admission is similar to the finding of a previous study that highlighted AMA increased the risk of FGR, neonatal death, NICU unit admission restriction and GDM [4].

References

1. Burdorf A, Brand T, Jaddoe VW, Hofman A, Mackenbach JP, Steegers EA. The effects of work-related maternal risk factors on time to pregnancy, preterm birth and birth weight: the Generation R Study. Occup Environ Med. 2011; 68(3):197–204. d10.1136/oem.2009.046516. [PubMed].

2. Chloe V, Ruth CF. Pregnancy and advanced maternal age. Progress in Obstetrics and gynecology 2006; 17: 13-24.

3. Wang Y, Tanbo T, Abyholm T, Henriksen T. The impact of advanced maternal age and parity on obstetric and prenatal outcomes in singleton gestations. Arch Gynecology Obstetric 2011; 284: 317.

4. Herstad L, Klungsoyr K, Skjaerven R, Tanbo T, Eidem I, Forsen L, et al. Maternal age and elective cesarean section in a low-risk population. Acta Obstet Gynecol Scand. 2012; 91:816–823.

5. Kuklina EV, Ayala C, Callaghan WM. Hypertensive disorders and severe obstetric morbidity in the United States: 1998–2006. Obstet Gynecol. 2009;113 (6):1299–306. Pupmid:19461426

6. Martin LP. Current Obstetrics and Gynecology. Boston: Lange Medical Book Series.1994; pp: 322–347.

7. Verma S. Advanced maternal age and obstetric performance. Apollo Med. (2009) Dec; 6 (3): 258-263.

8. Joseph KS, Lisonkova S, Muraca GM, Razaz N, Sabr Y, Mehrabadi A, et al. Contribution of improved surveillance to temporal increases in maternal mortality in the United States. Obstet Gynecol. 2017;129 (1):91–100.

9. Chescheir N. Enough already. Obstet Gynecol. 2015;125: 1–4

10. Olusanya BO and Solanke OA. Prenatal correlates of delayed childbearing in a developing country. Arch Gynecology Obstet. 2012; 285 (4): 951-957.

11. Johnson JA, Tough S, Society of Obstetricians and Gynaecologists of Canada. Delayed child-bearing. J Obstet Gynaecol Can. 2012;34 (1):80–93. [PubMed]: 22260768.

12. Office for National Statistics. Births in England and Wales: 2015. Live births, stillbirths, and the intensity of childbearing measured by the total fertility rate. London: Office for National Statistics; 2016 [cited 2017 Apr 21].

13. Khalil A, Syngelaki A, Maiz N, Zinevich Y, Nicolaides KH Maternal age and adverse pregnancy outcome: a cohort study. Ultrasound in Obstetrics & Gynecology 2013; 42: 634–643.

14. Giri A, Srivastav VR, Suwal A, Tuladhar AS Advanced maternal age and obstetric outcome. Nepal Medical College Journal: NMCJ 2012; 15: 87–90.

15. Odibo AO, Nelson D, Stamilio DM, Sehdev HM, Macones GA Advanced maternal age is an independent risk factor for intrauterine growth restriction. Am J Perinatol 2006; 23: 325–328. [PubMed]:16799913

16. Usta IM and Nassar AH. Advanced maternal age, Part I: obstetric complications. Am J Perinatol. 2008; 25 (8):521-534.

17. Guedes M, Canavarro MC Characteristics of primiparous women of advanced age and their partners: a homogenous or heterogenous group? Birth2014 ; 41: 46–55. [PubMed]:24654637

18. Ishii M, Yamauchi T, Matsumoto K, Watanabe G, Taya K,Chatani F. Maternal age and reproductive function in female Sprague–Dawley rats. J Toxicol Sci 2012; **37**: 631–638.

19. Liu S, Liston RM, Joseph KS, Heaman M, Sauve R, Kramer MS. Maternal mortality and severe morbidity associated with low-risk planned cesarean delivery versus planned vaginal delivery at term. CMAJ. 2007; 176: 455–460.

20. Wax JR, Cartin A, Pinette MG, Blackstone J. Patient choice cesarean: an evidence-based review. Obstetric Gynecology Surv. 2004; 59:601–616.