

# Obstetric complications and adverse pregnancy outcomes among elderly primigravidae of age 35 years and above in Oman

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## Abstract

**Objective:** Worldwide it is becoming common to conceive at or beyond 35 years. In Oman, the age at marriage is increasing and more women are postponing childbearing. The tendency of delayed marriage and conception has effect on the mother and foetus. The objectives of this study were to review the obstetric complications and adverse pregnancy outcomes among elderly primigravidae of age 35 years and above compared to the younger primigravidae mothers of age 21-34 years in Oman.

**Materials and method:** The study was carried out at department of Gynecology and Obstetrics, Sultan Qaboos University Hospital (SQUH), Muscat, Oman, during the period between 2010 and 2016. The data for the study was extracted from the predesigned and approved data collection forms of the admissions and discharge registers of the obstetrics and gynecology ward of SQUH. Primigravidae at or older than 35 years at the time of delivery were classified as elderly primigravidae and those who are aged between 21 to 34 year were the control group. Maternal complications in pregnancy like gestational diabetes, hypertension, mode of delivery, neonatal outcome of all these women were collected from the hospital information records and delivery ward registry.

**Results:** There was a significant increase in the rate pre-eclampsia up to 19.2% compared to the control group of 4.1% and cesarean section rate up to 38.4% compared to control group of 21.9 %. There was no significant increase in other complications.

**Conclusion:** Maternal age at the first pregnancy influences pregnancy and neonatal outcome. Hence elderly primigravida women should be considered as high risk and followed up accordingly.

## Introduction

Over the last four decades, many remarkable changes in the demographics of childbearing have been noticed in both developed and many developing countries [1-3]. Those changes include rising trends in age at first marriage, postponing childbearing until later reproductive years, and increasing proportion of mothers at advanced ages of as well as increasing proportion of primigravidae at advanced age in particular [4-7]. In the United States, for example, the percentage of first births for women 35-39 years of age increased by 24% and that for women 40-44 years of age increased by 35% between 2000 and 2012 [4,8].

The trend toward delaying pregnancy is mainly due to social, economic and cultural changes, but also to a better control of preexisting chronic disease, advances in assisted reproduction technologies and the availability of safe, effective contraception [9,10]. As educational, employment and career opportunities opened for women, they could choose between motherhood and other activities, which have fundamentally altered the temporal pattern of reproductive behavior [11,12].

First-time mothers over 35 years are often called as "elderly primigravidae" and considered as "at risk," which is an issue of concern to the health professionals, women and their families [13-15]. However, whilst there are numerous studies in this area, with the majority of

studies suggesting that increased maternal age (35 years of age or older) is associated with an increased risk of maternal morbidity, obstetric complications, and adverse pregnancy outcomes, some studies have demonstrated inconsistent conclusions about both the specific outcomes adversely affected by maternal age and the strength of the association [16,17]. These conflicting findings may be attributed to a number of methodological differences and limitations of the data. In addition, some studies have also demonstrated many positive aspects related to childbearing at a later age, such as better family functioning, higher family stability and a more stable economic position of parents [18,20]. This might be due to the fact that the contemporary older mothers tend to be well educated, of higher socio-economic status and of lower parity than older mothers from the recent past [21,22].

Like most western society, Oman, an oil rich Arabian Gulf Country, is passing through a rapid demographic transition [23]. In Oman age

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at marriage is increasing [24] and the proportion of births occurring to women aged 35-49 years has increased 25% between 1988 and 2008 [25]. The important characteristics of the age pattern of recent fertility in Oman is that it is broad and flat topped, indicating a continuation of fertility at a higher rate until ages 35-39 [25]. The desire to have larger families, which is widely prevalent in Oman and in other Middle East countries, also implies that some of our patients in Oman voluntarily continue childbearing beyond 35 years. This changing reproductive behavior might have relation with the increasing trends in premature birth and low birth weight [26]. However, existing information about advanced maternal age, specifically regarding elderly primiparity at the ages  $\geq 35$  years is limited.

Although, there are numerous studies on advanced maternal age and its relation with maternal morbidity, obstetric complications, and adverse pregnancy outcomes, research on elderly primigravidae is limited, and in research this group is often entrenched within a larger population, which is primarily multipara [27,28]. As the number of elderly primigravidae is growing and expected to rise further, it is necessary to determine whether they constitute a specific risk group requiring a unique clinical approach. Hence the purpose of this study is to review the obstetric complications and adverse pregnancy outcomes in Omani elderly primigravidae women. It is designed to compare pregnancy and birth outcomes of elderly primigravidae mothers with younger primigravidae aged 20-34 years. The research Question was that, does advanced maternal age in pregnancy carries more antepartum, intrapartum, postpartum and neonatal complications as compared to pregnancy among younger age. Our results may contribute to understanding of the risks associated with advanced maternal age. Results, outcome and findings may be useful in providing guidance to health care professionals and service providers in Oman.

## Methods and materials

This study is based on a case-control study design. The elderly primigravidae mothers were considered as case, while the primigravida mothers of age 20-34 years of age were considered as control group. The study was carried out at the department of Gynecology and Obstetrics, Sultan Taboos University Hospital (SQUH), Muscat, Oman, during the period between 2010 and 2016. SQUH is a governmental educational medical institution for undergraduate and postgraduate medical training and research. It provides both secondary and tertiary medical care to general population. Patients from all over Oman from any socioeconomic background have free access to health care service at SQUH.

The data for the study was extracted from the predesigned and approved data collection forms of the admissions and discharge registers of the obstetric and gynecology ward of SQUH. These standardized delivery logs contain selected vital information about maternal demographic, and maternal complications in pregnancy like gestational diabetes, hypertension, mode of delivery, neonatal outcome of all women admitted in the hospital for delivery. Nurses or midwives fill these records upon admission and immediately after delivery. All these records are routinely kept in the hospital as hard copy. For the purpose of this study, the data were extracted using the inclusion criteria: Omanis, not known to have any medical disease, spontaneous conception and a singleton pregnancy. Those who were non-Omanis, history of any medical disease and history of previous miscarriage, multiple pregnancies and ovulations induced pregnancies were all excluded. During our data collection period, 73 elderly primigravidae mothers were selected. An equal number of 73 mothers of age between

20-34 years were selected as control group using the same inclusion criteria.

The data entry and analysis were done using SPSS software. Statistical analysis was performed to evaluate the association between advanced maternal age at first pregnancy ( $\geq 35$  years) and specific obstetric problems and outcomes. Control aged group mothers of age 20-34 years at the time of delivery constituted the reference category.

Univariate analyses included t test for continuous variables and Chi-square test for categorical variables or Fisher's exact test for small cell sizes. Missing data were not included in the analyses. A P value of  $<0.05$  was considered significant. Univariate and multivariable logistic regression model were employed to estimate the unadjusted and adjusted risk of specific obstetric complications and neonatal outcomes of the elderly primigravidae with reference to pregnancy to mothers aged 20-34 years. The risk was measured by the odds ratio.

## Results

The study started with total of 230 primigravidae, all delivered in SQUH. However, 83 cases were excluded due to having history of medical diseases, previous miscarriage or ectopic pregnancies or a pregnancy that happened after assisted reproductive technologies. Of the remaining 146 cases, 73 cases were elderly primigravidae (the case) and the rest 73 cases were the primigravidae mothers of age 21-34 years (the control). The mean age of women in the cases group was observed to be  $36.6 \pm 1.6$  (SD) years with mean gestational age at delivery  $38.3 \pm 2.5$  (SD) years. The mean age of women in controls group was observed to be  $26.8 \pm 3.44$  (SD) years with mean gestational age at delivery  $38.2 \pm 1.8$  (SD) years. There was no significant difference in mean gestational age of the two groups of mothers.

Table 1 presents the prevalence of specific obstetric complications and neonatal outcomes among elderly primigravidae mothers and the primigravidae mothers of age 21-34 years as well as the risk ratio of specific obstetric complications and neonatal outcomes of elderly primigravidae mothers with reference to control group mothers. The results indicate significantly higher risk of preeclampsia, caesarean section delivery and perinatal trauma among the elderly primigravidae mothers than those of control group mothers of age 21-34 years. For example, the prevalence of pre-eclampsia was 19.2% among the elderly primigravidae group compared to 4.1% among the control group. The elderly primigravidae group had 6 times higher risk of pre-eclampsia than their younger peers of age 20-34 years (OR=6.03; 95% CI: 1.66 - 21.86). The elderly primigravidae mothers had 2.2 times higher risk of caesarean section delivery than the control group mothers (OR= 2.21; 95% CI: 1.07 - 4.59). The rate of caesarean section delivery was observed to be 38.4% among the elderly primigravidae as oppose to 21.9% among the control group. Perinatal trauma also increased significantly among elderly primi (9.6%) than the control group (5.5%). Elderly primi had 2.1 times higher risk of perinatal trauma than the control group mothers (OR=2.10; 95% CI:1.02 - 3.79).

The above mentioned significant higher risk of pre-eclampsia, caesarean section delivery and perinatal trauma among the elderly primigravidae mothers than the control group mothers, however, obtained through univariate analysis, providing unadjusted effect of maternal age. To obtain adjusted effect of maternal age on obstetric complications and neonatal outcomes, multiple logistic regression analysis were done considering each of the obstetric complications and neonatal outcomes as outcome variable and maternal age as predictor after controlling the potential effect of other obstetric complications and neonatal outcomes. The results are presented in Table 2. Multivariate

**Table 1.** Obstetric complications and neonatal outcomes by maternal age

Obstetric complications, and neonatal outcomes	Maternal age		Unadjusted Odds ratio (95% CI)	P value
	21-34 years (n=73)	≥35 years (n=73)		
Anemia	13.7	11.0	0.78 (0.28 - 2.09)	0.615
Gestational Diabetes	19.2	24.7	1.37 (0.63 - 3.04)	0.424
Mean gestational age (week) ± SD	38.3 ± 1.8	38.2 ± 2.5		0.852
Preeclampsia	4.1	19.2	6.03(1.66 - 21.86)	0.003
Preterm labor	11.0	9.6	0.86 (0.29 - 2.51)	0.785
IUGR	11.0	6.8	0.60 (0.186 - 1.92)	0.383
Cesarean section delivery	21.9	38.4	2.21 (1.07 - 4.59)	0.032
Perinatal trauma	5.5	9.6	2.10 (1.02 - 3.79)	0.048
Postpartum hemorrhage	5.5	6.8	1.26 (0.32 - 4.92)	0.731
Low birth weight (<2500 gm)	17.8	13.7	0.73 (0.29 - 1.79)	0.496
Premature birth (<37 week)	15.1	16.4	1.10 (0.45 - 2.70)	0.820
NICU admission	8.2	11.0	1.39 (0.45 - 4.17)	0.574

IUGR = Intrauterine growth retardation

NICU = Neonatal Intensive Care Unit

**Table 2.** Results of multiple logistic regression analysis showing the adjusted risk of Obstetric complications for elderly primigravidae

Obstetric complications	Adjusted odds ratios*	95% CI	P-value
Preeclampsia	12.18	2.43 - 24.78	0.004
Cesarean section delivery	2.25	1.05 - 4.83	0.038
Perineal trauma	2.53	0.56 - 11.61	0.125

\*Adjusted odds ratios were obtained after controlling the potential confounding effects of other obstetric complications, such as gestational age, anemia, gestational diabetes, preterm labour, etc.

analysis identified elderly primigravidae as the significant predictor for pre-eclampsia and caesarean section. Although, perinatal trauma showed significant higher risk for elderly primigravidae mothers in univariate logistic regression analysis, it becomes insignificant in multivariate analysis. Multivariate analysis showed elevated higher risk of pre-eclampsia and caesarean section delivery among elderly primigravidae mothers than control group mothers, indicating elderly primigravidae as independent significant predictor of these two obstetric complications.

Our analysis showed higher prevalence of gestational diabetes, postpartum hemorrhage, premature birth and NICU admission among the elderly primigravidae mothers than their peers of age 21-34 aged mothers. However, the differences were not statistically significant. The prevalence of gestational diabetes was found to be higher among elderly primigravidae than the control group (24.7% vs 19.2%), and the risk of gestational diabetes was 1.37 times higher among the elderly primigravidae group than the control group. However, the effect was not statistically significant (OR= 1.37; 95% CI: 0.63 - 3.04).

On the other hand, elderly primigravidae mothers were found to have lower risk of certain obstetric complications and neonatal outcomes, such as anemia, preterm labor and low birth weight, than the control group mothers. However, the differences were not statistically significant. For example, anemia was less prevalent among elderly primigravidae compared to younger primi of age 20-34 years (11.0% vs 13.7%).

## Discussion

The main objective of this study was to investigate if elderly primigravidae is a risk factor for obstetric complications and adverse outcomes pregnancy outcomes using a hospital-based case-control type study design in Oman. In contrast to most other studies relating to advanced maternal ages irrespective of parity, this study population included only elderly primigravidae of age ≥ 35 years. This would help

understand the extend of risk of obstetric complications, and neonatal outcomes among the first-time mothers at an advanced age of 35 years or more.

The main findings of the study indicated that elderly primigravidae bears significantly higher risk of pre-eclampsia and caesarean section delivery compared to younger mothers of age 21-34 years. A recent population based study in Oman also reported higher risk of pre-eclampsia and caesarean section delivery among elderly mothers of age 35 years or more irrespective of their gravidae [25]. Our finding of higher pre-eclampsia among elderly primigravidae is consistent with finding of Ben-David et al reporting higher risk of pre-eclampsia among first time mothers of very advanced maternal age ≥40 years in Israel [29].

We also found an incremental and highly significant increase in the rate of Caesarean delivery in primigravidae elderly women aged 35 years and more when compared to women aged 21-34 years. This is in line with the findings of other researchers. For example, Bell et al. [30] who reported caesarean rates in the range of 25-35% for women aged ≥35 years and approximately 40% for women aged > 40 years compared with estimates of 14-20% for women aged <35 years. In our study, increased rate of cesarean section up to 38.4% compared to control group of 21.9 % with OR= 2.25, 95% CI: 1.05 - 4.83, P-value of 0.038. This finding has implications for maternity service providers, particularly as trends of advanced maternal age continue.

Various reasons have been offered to explain increased risk of caesarean delivery among advanced-age mothers, including increasing obstetric complications with aging, non-reassuring fetal status in older age, increasing obesity with aging, increasing risk of abnormalities in the course of labour, malpresentation, multiple gestations, placenta praevia, macrosomia, arrest of descent, prior uterine surgeries, arrest of dilatation, induction of labour, repeat caesarean delivery, and caesarean delivery on maternal request [13,31-33]. Insufficient myometrial efficiency with aging may also be a possible reason for increased caesarean delivery

among advanced-age mothers [34]. Advanced maternal age has also been observed that may be alone a factor influencing both mother and physician's decision to have caesarean delivery [35].

Advanced maternal age has been found to be associated with a range of adverse pregnancy outcomes [15,36-38]. Like many other previous studies, our analysis showed higher prevalence of gestational diabetes, postpartum hemorrhage, premature birth and NICU admission among the elderly primigravidae mothers than their younger primigravidae of age 21-34 aged mothers. However, the differences were not statistically significant. Unlike the findings of most previous study, our analysis showed lower risk of certain obstetric complications and neonatal outcomes, such as anemia, preterm labor and low birth weight, among elderly primigravidae than the control group mothers. However, the differences were not statistically significant. The non-significant differences in above mentioned cases might have some relation with the small sample sizes of our study groups and the changing demographic and socio-economic characteristics of contemporary elderly primigravidae. The small sample size of the study subjects may limit the ability to test the statistical significance, because it is likely to provide wider confidence intervals for some study variables suggesting lack of power. On the other hand, the contemporary elderly mothers are likely to be well educated [21], and of higher socio-economic status than older mothers from the recent past [39]. It has been suggested that social advantage may ameliorate some of the adverse effect of advanced maternal age on perinatal Outcome [40]. In recent years, older women who become pregnant are more often primiparous and of better socio-economic status while in the past they were more often multiparous and of low socio-economic status [40,41].

The present study has several limitations. Firstly, this is a retrospective study based on medical records. This prevented us to include many important variable, such as maternal health and nutrition level, their life style, level of education and socio-economic status. Secondly, the study population included only women who gave birth at SQU hospital, and the results may not be generalized. Thirdly, as mentioned above, the small sample size of the study subjects limits the ability to test the statistical significance.

## Conclusion

In conclusion, this study focused on primiparae, distinguishing it from most other studies relating to advanced maternal age. Maternal age at the first pregnancy carries influences on the mother, pregnancy and neonatal outcome. Hence elderly primigravidae are considered as high risk pregnancy and they need special attention and care during pregnancy and child birth. By knowing and understanding the risk of complications, we expect to establish better standards in practice.

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