

Pregnancy outcomes in women greater than 45 years: a cohort control study in a multi-ethnic inner city population

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Abstract

Objective To examine the pregnancy outcomes of women >45 years in a multi-ethnic population when compared to controls and to reflect on socio-demographic details of the older mothers.

Design A retrospective cohort control study over an 8-year period in an inner city London hospital with multi-ethnic population. The influence of advanced maternal age (>45 years at time of delivery) on fetal and maternal outcomes was assessed by comparing these women to controls (aged 20–30 years) matched for ethnicity, country of origin and parity.

Results Data from 64 cases and 64 controls were compared. Ninety percent of the index group had undergone assisted conception. Mothers >45 years had a fourfold increase in cesarean section (35/64 vs 8/64), a threefold increase in blood loss (669.2 vs 272.4 ml) (both $p < 0.001$) and were more likely to have preterm birth (12/64 vs 3/64) ($p < 0.05$). Only 5 % of the 64 women were born in the United Kingdom, 52 % were unemployed and 50 % were not fluent in English. Seventy-five percent of the study population were multiparous, 52 % of the pregnancies were unplanned and 90 % had conceived spontaneously.

Conclusion In an inner city immigrant population, older mothers >45 years were more likely to have cesarean sections, postpartum hemorrhage and premature deliveries. Moreover, social and demographic factors suggest that late child bearing is influenced by cultural factors such as acceptance of large families and lack of contraception.

Keywords Advanced maternal age · Over 45 · Pregnancy outcome · Multiethnicity

Introduction

In the United States, the mean maternal age at first pregnancy has increased from 24.6 in 1970 to 27.2 years in 2000, while the birth rate to mothers >44 years has trebled over the 30 years between 1970s and 2005 from 0.2 to 0.6/1,000 births [1]. Similarly, according to the Office for National Statistics for England and Wales, the number of live births occurring in mothers >45 years (“very advanced maternal age”) has doubled over the last 11 years, from 0.1 % in 1999 to 0.23 % in 2009 [2]. Delaying pregnancy until a later age is becoming more prevalent producing a need for information on the associated complications and risks.

With advancing age, the incidence of maternal and fetal complications is increased as compared to younger women [3, 4]. These include pregnancy-induced hypertension, gestational diabetes, amniotic fluid embolisms, as well as higher rates of elective cesarean section (CS), while premature birth, small for gestational age and low birth weight infants are known to be more common in older mothers [3, 4]. With the “very advanced maternal age” [10], there is also a greater likelihood of comorbidities affecting the mother, such as cardiovascular disease and diabetes.

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Much of the data on maternal and fetal risks in older mothers come from case series of women who had undergone artificial conception techniques (ACT) [1]. The two recent retrospective studies looking at pregnancy outcomes of very advanced maternal age in Australia [5] and Chile [6] compared mothers over 45 and 50 years, respectively, to younger controls. These two cohort control studies (which included predominantly spontaneous conceptions) noted that 66 % of the older mothers had no pregnancy complications and over 50 % achieved normal vaginal births, while adverse fetal outcomes documented were preterm birth (11.7 and 9.38 %), small for gestational age (10.4 and 5.03 %), stillbirth (2.6 and 1.16 %) and admission to a specialist care unit (17 %) [5].

Our study evaluated pregnancy outcomes of women >45 years at delivery who have given birth in an inner city hospital with a multi-ethnic population whereas previous studies have not examined such an ethnically diverse population. Common medical and media perceptions implied that many women defer pregnancy for social and career reasons, resulting in a large cohort of aging mothers [7, 8] and we had the opportunity to assess if this could be extrapolated to a migrant population of women from an inner city area of London. Thus, the aims of the study were twofold: to compare pregnancy outcomes in the two groups and to reflect on socio-demographic details of the older mothers, which comprised mainly immigrants (95 %).

Method

This was a retrospective cohort control study over an 8-year period between January 2004 and February 2011 in an inner city London teaching hospital. The hospital delivery electronic database was used to retrieve data for women aged over 45 years at the time of delivery and this was complemented by manual data collection from patient files in cases where the former was incomplete. The control group consisted of the next sequential delivery following the index case in the hospital delivery database aged between 20–30 years matched for ethnicity, country of origin and parity.

The following maternal data: maternal age, history of diabetes/hypertension, body mass index (BMI), alcohol and nicotine intake, gestational age, method of delivery, duration of the second stage of labor, perineal trauma, total blood loss and length of stay were compared between the two groups. Fetal birthweight, Apgar scores at 1 and 5 min as well as admission to Special Care Baby Unit (SCBU) were also recorded. Data for socio-demographic variables such as ethnicity, country of origin, length of residence in the host country, mode of conception, use of anomaly screening, occupation and fluency in English were obtained

for the study population using the electronic database and patients' notes. Women who were not born in the United Kingdom and came to UK as adults were classified as immigrants, while the term "ethnicity" referred to the specific ethnic groups as defined in the 2001 United Kingdom Ethnicity Census.

The data were normally distributed when subjected to Kolmogorov–Smirnov test and parametric statistics were used for analysis with a *p* value of less than 0.05 taken to infer statistical significance.

Results

During the study period, there was a total of 24,436 deliveries greater than 24 weeks gestation at North Middlesex University Hospital; of these, 64 were aged >45 years at the time of birth, representing a prevalence of 2.6 per 1,000 live births.

The demographic data of the study and control populations are depicted in Table 1. The ethnic distribution was Turkish 30 %, African 22 %, White British 20 %, Afro-Caribbean 20 % and others 8 %. Fifty-five percent of women >45 years had comorbidities, such as gestational diabetes, depression, hypertension and lupus. Interestingly, 60 % of older mothers underwent serum screening for chromosomal abnormalities and of these, 50 % were at high risk of Down's syndrome, 60 % of whom proceeded to karyotyping (all were normal).

Although there were no intrauterine or neonatal deaths in either group, older mothers were four times more likely to have preterm births under 36 weeks (12/64 vs 3/64, $p < 0.05$) and on average, delivered 2 weeks earlier (37.9 vs 39.1 weeks, $p < 0.05$) as compared to the control group. The study population was four times more likely to deliver by cesarean section (CS) (54.7 % vs 12.5 %, $p < 0.05$) with a correspondingly higher estimated blood loss (669.2 vs 272.4 ml, $p < 0.0001$), although instrumental delivery rate was similar in both groups (5/64 vs 1/64, $p > 0.05$). Delivery by elective CS was 11 times more common in women over 45 years as compared to controls (23/64 vs 2/64, $p < 0.0001$) and the majority (92 %) of these were for medical indications such as repeat CS rather than maternal requests. Gender of the babies delivered were comparable in the two groups (32/64 vs 38/64 males, $p > 0.05$) and there were no significant difference in the mean birth weight (3,145.5 vs 3,300.5 g) or Apgar scores at 1 min (8.5 vs 8.4, both $p > 0.05$), although babies in the study group were four times more likely to require admission to SCBU as compared to those in the control group (12/64 vs 3/64, $p < 0.0001$).

The majority of women conceived naturally and the mean parity was 2.38 ± 1.34 with 16 % of the study

Table 1 Summary table showing maternal characteristics, intrapartum outcomes and fetal factors

	Study group (>45 years)	Control group (20–30 years)	<i>p</i> value
Maternal characteristics			
Mean maternal age (years)	45.9 (2.3)	26.5 (3.2)	<0.0001
History of diabetes	5/64 (7.8 %)	3/64 (4.7 %)	NS
Parity	3 (1.99)	2.0 (1.76)	NS
Intrapartum outcomes			
Total CS	35/64 (54.7 %)	8/64 (12.25 %)	<0.0001
Elective CS	23/64 (35.9 %)	2/64 (3.1 %)	<0.0001
Emergency CS	12/64 (18.75 %)	6/64 (9.4 %)	<0.05
Normal vaginal delivery	28/64 (43.7 %)	50/64 (78.1 %)	<0.01
Assisted vaginal delivery	1/64 (1.6 %)	5/64 (7.8 %)	NS
Mean total blood loss (ml)	669.2 (575.7)	273.5 (188.2)	<0.0001
Fetal factors			
Gestational age (weeks)	37.9 (3.02)	39.1 (3.11)	<0.05
Birth weight (g)	3,145.5 (677.3)	3,306.1 (605.2)	NS
Admission to SCBU	12/64 (18.7 %)	3/64 (4/7 %)	<0.0001
Apgar score at 1 min	8.48 (1.19)	8.38 (1.22)	NS
Apgar score at 5 min	9.19 (1.02)	9.13 (1.22)	NS

Values depicted as means and SD and as percentages

population being primigravids; only 10 % had ACT and donor eggs were used in all cases. Ninety percent declined sterilization when offered postnatally.

Most women had settled in the United Kingdom for <10 years and 50 % arrived in the preceding 12 months. Furthermore, 50 % were not fluent in English and needed translators during consultations. Of these women, 52 % were unemployed, 36 % were housewives, 7 % acted as carers, 2 % were studying and occupations listed included catering assistant, nursery assistant, milliner, cleaner, beautician and tailor, with only 3/64 being “professionals” (two solicitors and a teacher). Three percent of the study population had tertiary education as compared to 50 % in the controls.

Discussion

It is well established that women of very advanced maternal age (≥ 45 years) are at increased risk of both maternal and neonatal complications [1]. However, the majority of these pregnancies result from ACT and the outcomes of spontaneous conceptions have been largely understudied in this age group.

There are only six published studies reporting on spontaneous conceptions in mother >45 years in the English literature, with pooled data of 505 women in total [5, 6, 9–12]. Only three of these were case or cohort control studies [5, 6, 12] where the control groups were matched for ethnicity and parity to further reduce bias. The data from these six studies were from populations in both

developed and developing countries [5, 6, 9–12] and suggest that the original concept of career-oriented women of higher socioeconomic status delaying conception until they have established a career (so popular in the Western press) should not be extrapolated to women of different ethnicity and culture [13].

Our study appears to show a far higher prevalence of spontaneous pregnancies >45 years (2.6/1,000) than reported in comparable developed countries such as Australia (0.6/1,000 births) [1, 5]. It must be remembered, however, that our data come from a single maternity unit serving an inner city multi-ethnic population, with the majority being relatively newly arrived immigrants: in this context, the prevalence of older mother in our population is not dissimilar to that documented in developing countries [11, 12]. However, our findings should not be extrapolated to other mothers of advanced age in the United Kingdom (UK) due to their unique social stratum.

Callaway’s study [6] from Queensland, Australia (76 women >45 years) showed very similar data to ours as did Kale’s [12], who examined pregnancy outcomes in Turkish high parity women over 45 years. Our prevalence of GDM was not statistically higher in the study as compared to the control population (7.8 vs 4.7 %, $p > 0.05$) and was in concordance with previous published studies [5, 10]. Pre-eclampsia does not seem a problem in the 64 women studied and this may reflect the protective effect of multiparity in these older women for this condition [14]. The fourfold increase in the rate of CS in the women >45 years (35/64 vs 8/64) was consistent with many studies included in Schoen and Todd’s review article on pregnancy in older

mothers [1] as well as in the national report on CS in the UK which [15] documented a global increase with age from 25 % in 30- to 34-year olds, compared to 35.9 % in 40- to 50-year olds. Interestingly, 90 % of elective CS in our study were performed for medical indications rather than maternal request due to “precious pregnancies”.

Although several authors have suggested higher rates of maternal morbidity and perinatal complications associated with advancing maternal age [6, 11, 12], the pregnancy outcomes in our study were generally good with no maternal or perinatal deaths and appear to mirror the data from immigrant mothers >50 years in a similar inner city population in the UK [9]. Contrary to studies by Donosu [6] and Abu Heija [11] (on predominantly native Chilean and Jordanian population) who quoted perinatal mortality of 8 and 11 %, respectively, there was no difference in the perinatal mortality rates between our study and control groups. The low perinatal complications could indicate current higher surveillance in immigrant pregnant women in the UK as well as the confounding influence of the “healthy immigrant” effect [15, 16]. Reassuringly, there were no documented maternal deaths in these studies but this is more likely to reflect the inadequacy of these study sizes than a truly reduced risk in this group. According to the World Health Organisation, the estimated global maternal mortality ratio was 260 deaths per 100,000 live births and given that pooled published study population amounted to 505 women, it is unsurprising that no maternal deaths were documented in this or other studies.

Because it was a retrospective study, we were not able to verify if primigravidas delayed pregnancy because of career. More than half (52 %) were not employed and only 3/64 women had “professional” jobs: while we cannot speculate, it is likely that this cohort of women probably did not delay their pregnancy because of a “high profile” career.

What was striking in our study was that majority were unplanned pregnancies and future fertility is still an issue as 90 % declined sterilisation when offered. Our study suggests that especially in immigrants, it appears late child bearing is influenced by cultural factors such as acceptance of large families and lack of contraception, although more research may be carried out to explain these hypotheses.

Conflict of interest None.

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