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Pregnancy Outcome among Nulliparous Women at the University of Maiduguri Teaching Hospital, North Eastern Nigeria: A Retrospective Cohort Study

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Authors' contributions

The study was carried out in collaboration between all authors. Author ADG designed the study, performed the statistical analysis and reviewed the final manuscript. Author SMI wrote the result, discussion and final draft of the manuscript. Author ZO collected the data and wrote initial draft of the manuscript. Author BMA conceptualized the idea and reviewed the final manuscript. All authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aim: To compare the pregnancy outcomes among nulliparae, with multiparae as the control.

Study Design: Retrospective cohort study.

Place and Duration of Study: University of Maiduguri Teaching Hospital over a period of one year (1st January 2007 to 31st December 2007).

Methodology: This retrospective cohort study reviewed the pregnancy outcome of nulliparae over one year, using multiparae as control. The data were analysed using SPSS. The χ^2 -test was used to compare the sociodemographic characteristics and pregnancy outcomes of the nulliparae and the multiparae. Multivariate logistic regression analysis was used to create a model for the factors that were independently associated with nullipara. A *P*-value of <0.05 was considered significant.

Results: Nulliparae contributed 259 (13.7%) of the 1,865 babies delivered during the period of study. The age ranged from 15 years to 42 years with mean age of 27.1 years \pm 5.3 years. Nulliparous women were more likely to be of younger age less than 20 years

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($P<0.001$), educated ($P=0.01$) and booked early ($P=0.001$) when compared with multiparae. Also nulliparous women were more likely to have pregnancy induced hypertension ($P=0.001$) and episiotomy at delivery ($P<0.001$) but less likely to have anaemia ($P=0.002$) when compared with multiparae. Multivariate logistic regression showed that Nulliparae were more likely to be of younger age group (OR 7.22, $P<0.001$) and have malaria (OR 2.22, $P=0.02$), malpresentation (OR 5.68, $P=0.02$), abruptio placentae (OR 6.41, $P=0.02$), preterm delivery (OR 7.04, $P=0.01$), episiotomy (OR 7.74, $P<0.001$) and pregnancy induced hypertension (OR 3.53, $P=0.01$) but less likely to have anaemia at booking and fetal macrosomia.

Conclusion: Nulliparous women are at increased risk of certain adverse pregnancy outcome including malaria, preterm delivery and pregnancy induced hypertension. These adverse factors should be looked out for and excluded in order to improve maternal and fetal health in these women.

Keywords: Nullipara; multipara; pregnancy outcome; North-East Nigeria.

1. INTRODUCTION

Parity is the number of deliveries a woman has had. The relationship between parity and pregnancy outcome has been of concern to obstetricians for decades [1,2] and studies have shown association between parity and adverse pregnancy outcome [3-5]. Based on associated risk, parity is often classified into 3 groups: nulliparity, multiparity, and grand multiparity with nulliparous and grand multiparous women regarded as being at higher risk of pregnancy complications [2]. It is however not clear whether this classification of parity is appropriate in terms of pregnancy outcome [2].

Compared to other parity groups, nulliparous women were found to be at high risk for development of specific problems, including pregnancy-induced hypertension (PIH), preeclampsia and eclampsia [6,7]. Malaria is more frequent and more severe in nulliparous women and their labour may become prolonged leading to interventional deliveries [7]. Also because of the fact that nulliparae have no obstetric history, their risk assessment is deficient thereby increasing their likelihood of complication [8]. On the other hands, multiparae are more likely to have medical problems such as chronic anaemia, diabetes mellitus and/or chronic hypertension [9,10]. The incidences of placental praevia, placental abruption and malpresentation occur with increased frequency in multiparae and grandmultiparae [9].

There are few studies from sub-Saharan Africa that addressed risk of nulliparity independent of extreme of maternal age [2]. In most settings of developing countries including Nigeria, there is limited access to medical care and, therefore, the need to identify women whose pregnancy is at increased risk of complications is an important part of antenatal screening.

The aim of this study was to compare the pregnancy outcome among nulliparous women, with multiparae as the control.

2. METHODOLOGY

This retrospective cohort study reviewed the pregnancy outcome of nulliparous women who delivered at the University of Maiduguri Teaching Hospital over a period of one year (1st

January 2007 to 31st December 2007). Ethical approval was given by the University of Maiduguri Teaching Hospital ethical and research committee.

For each nullipara, the next multipara that delivered in the same period was taken as control. Exclusion criteria in both groups were as follows: renal disease (pre-existing or diagnosed in pregnancy based on significant proteinuria of ≥ 300 mg in 24 hours, renal ultrasound indication of shrunken kidneys and GFR of ≤ 60 ml/min/1.73m²), cardiac disease (pre-existing or diagnosed in pregnancy either clinically or by echocardiogram), retroviral disease and previous uterine scar. This is because such pregnancies carry an increased risk of adverse outcome. The labour ward records and patients' case notes were used to extract information on the sociodemographic characteristics and pregnancy outcomes of all the patients. The data was extracted by the researchers using a Proforma designed for the study.

Nulliparity was defined as having no previous delivery and primiparity as having 1 previous delivery. Multiparity was defined as having 2–4 previous deliveries and grand multiparity as having 5 or more deliveries. Anaemia was taken as pack cell volume of $< 30\%$ at any stage of pregnancy. Postpartum haemorrhage (PPH) is a blood loss of ≥ 500 ml or 1,000 ml following vaginal delivery or caesarean section, respectively. Placenta praevia was based on obstetric ultrasound scan finding. Patients who were first seen in the labour ward were recorded as unbooked. Gestational age was calculated based on the last menstrual period (LMP) and/or early ultrasound scan (USS). Low birth weight was $< 2,500$ g and macrosomia as $\geq 4,000$ g. Education was considered as completion of at least primary school education. Preterm delivery is when delivery occurs before 37 completed weeks of gestation. An operative delivery covers both instrumental vaginal delivery and caesarean section. Early booking refers to antenatal booking and supervision of pregnancy before 20 weeks of gestation.

The data were analysed using SPSS version 13 (SPSS, Chicago Ill, USA). The χ^2 -test was used for bivariate analysis to compare the sociodemographic characteristics and predetermined pregnancy outcomes of the nulliparae and the multiparae. In order to control for confounding factors, multivariate logistic regression to create a model for the factors that were independently associated with nullipara. Variables were selected for inclusion in the model, based on their perceived relevance or being significant as determined by the χ^2 -test. A p value of < 0.05 was considered significant.

3. RESULTS

Of the 1,865 women who delivered during the period of study, 259 (13.7%) were nulliparae. The comparison between sociodemographic characteristics of the nulliparae and multiparae is shown in Table 1. The age ranged from 15 years to 42 years with mean age of 27.1 years ± 5.3 years. The nulliparae were more likely to be of younger age i.e. less than 20 years ($P < 0.001$), educated ($P = 0.014$) and booked early ($P = 0.001$). There were no statistical differences between both groups as regards booking status.

Pregnancy complications across the two parity groups are shown in Table 2. Nulliparae were less likely to have anaemia ($P = 0.002$) but more likely to have Pregnancy Induced Hypertension ($P = 0.001$) compared to multiparae. There were no statistical differences between these groups in terms of malaria, malpresentation, multi-fetal gestation, placenta praevia and abruptio placentae.

Table 3 illustrates labour outcome in the nulliparae and the multiparae. The nulliparous women were more likely to deliver preterm while multiparous women were found to be more likely to have post-term delivery ($P=0.02$). Nulliparae were more likely to have episiotomy at delivery compared to multiparae ($P<0.001$). Duration of labour, mode of delivery, postpartum haemorrhage, birth weight and Apgar scores of the baby were not statistically different between the two groups.

Table 1. Comparison of socio-demographic characteristics between the Nulliparae and Multiparae

Characteristic	Nullipara N (%)	Multipara N (%)	χ^2 test	P value
Age group (yrs)				
<20	35(13.5)	7(2.7)	21.10	<0.001
20-34	196(75.7)	227(87.6)		
≥35	28(10.8)	25(9.7)		
Education				
Yes	148(57.1)	120(46.3)	6.06	0.01
No	111(42.9)	139(53.7)		
Booking status				
Booked	240(92.7)	246(95.0)	1.19	0.27
Unbooked	19(7.3)	13(5.0)		
GA at booking				
≤20	49(18.9)	23(8.9)	10.90	<0.001
>20	210(81.1)	236(91.1)		

Table 2. Comparison of pregnancy complications between the Nulliparae and Multiparae

Pregnancy complications	Nullipara N(%)	Multipara N(%)	χ^2 test	P value
Anaemia in Pregnancy				
Yes	63(24.3)	96(37.1)	9.88	0.002
No	196(75.7)	163(62.9)		
Malaria				
Yes	32(12.4)	21(8.1)	2.54	0.11
No	227(87.6)	238(91.9)		
Malpresentation				
Yes	9(3.5)	4(1.5)	1.97	0.16
No	250(96.5)	255(98.5)		
Multifetal gestation				
Yes	4(1.5)	10(3.9)	2.64	0.10
No	255(98.5)	249(96.1)		
Placental praevia				
Yes	3(1.2)	5(1.9)	0.51	0.48
No	256(98.8)	254(98.1)		
Abruptio placentae				
Yes	5(1.9)	2(0.8)	1.30	0.24
No	254(98.1)	257(99.2)		
PIH				
Yes	26(10.0)	8(3.1)	10.19	<0.001
No	233(90.0)	251(96.9)		

Table 3. Comparison of labour outcome between the Nulliparae and Multiparae

Labour outcome	Nullipara N(%)	Multipara N(%)	χ² test	P value
GA at delivery				
<37 weeks	8(3.1)	0(0)	8.13	0.02
37-42 weeks	232(89.6)	239(92.3)		
>42 weeks	19(7.3)	20(7.7)		
Duration of labour				
>8 hours	24(9.3)	25(9.7)	0.02	0.88
≤8 hours	235 (90.7)	234(90.3)		
Mode of delivery				
Caesarean section	10(3.9)	18(7.0)	1.82	0.18
Instrumental vaginal	5(1.9)	5(1.9)		
Spontaneous vaginal	224(94.2)	236(91.1)		
Episiotomy				
Yes	225(86.9)	129(49.8)	82.23	<0.001
No	34(13.1)	130(50.2)		
PPH				
Yes	15(5.8)	25(9.7)	2.71	0.10
No	224(94.2)	234(90.3)		
Birth weight				
<2.5 kg	16(6.2)	14(5.4)	3.24	0.20
2.5-3.9 kg	234(90.3)	227(87.6)		
≥4.0 kg	9(3.5)	18(7.0)		
Apgar score				
0	2(0.8)	4(1.6)	0.77	0.68
1-6	21(8.1)	19(7.3)		
≥7	236(91.1)	236(91.1)		

Table 4. Multiple logistic regression analysis showing some antepartum factors associated with Nulliparae in the study population

Adverse factors	Coefficient	Adjusted OR (95% CI)	P value
GA at booking			
>20 wks	-0.85	0.43(0.23-0.79)	0.01
≤20 wks	Ref	Ref	Ref
Malaria			
Yes	0.71	2.03(1.04-3.96)	0.04
No	Ref	Ref	Ref
Anaemia at booking			
Yes	-0.75	0.48(0.31-0.73)	<0.001
No	Ref	Ref	Ref
PIH			
Yes	1.26	3.53(1.42-8.81)	0.01
No	Ref	Ref	Ref
Placenta praevia			
Yes	-0.64	0.53(0.10-2.70)	0.44
No	Ref	Ref	Ref
Abruptio placentae			
Yes	1.86	6.41(1.37-29.92)	0.02
No	Ref	Ref	Ref

Table 5. Multiple logistic regression analysis showing some intrapartum and postpartum factors associated with Nulliparae in the study population

Adverse factors	Coefficient	Adjusted OR (95% CI)	P value
GA at delivery			
Preterm	1.95	7.04(1.54-32.19)	0.01
Postdate	-0.12	0.89(0.42-1.89)	0.76
Term	Ref	Ref	Ref
Operative deliveries			
Yes	0.32	1.38(0.59-3.22)	0.46
No	Ref	Ref	Ref
Episiotomy			
Yes	2.02	7.52(4.68-12.10)	<0.001
No	Ref	Ref	Ref
Apgar scores			
0	-0.15	0.86(0.42-1.77)	0.68
1-6	-0.21	0.82(0.38-1.77)	0.60
≥7	Ref	Ref	Ref
Birth weight			
< 2.5 Kg	0.02	1.02(0.44-2.36)	0.97
2.5- 4.0 Kg	Ref	Ref	Ref
> 4.0	-1.17	0.31(0.11-0.84)	0.02
PPH			
Yes	0.08	0.93(0.35-2.50)	0.88
No	Ref	Ref	Ref

After controlling for possible confounding factors using multivariate logistic regression analysis for each of the adverse factor, compare to their multiparous counterparts, the nulliparae were found to be more likely to have malaria, malpresentation, abruptio placentae, preterm delivery, episiotomy and pregnancy induced hypertension but less likely to book late, have anaemia at booking and fetal macrosomia (Table 4 and 5 above).

4. DISCUSSION

In the African setting, women have many children for various socio-cultural and gender reasons. Marriage is usually for childbearing purposes and a woman stabilizes her marriage by having many children [7]. This explains the low prevalence of 13.7 % of nulliparity in our study. This finding contrasts those in developed countries where 42 % of all pregnant women are nulliparae with multiparae and grandmultiparae constituting 50 % and 3 – 4 % respectively [5,11].

Teenage pregnancy is a common phenomenon in developing countries where early marriage is practiced [7]. From this study, nulliparae were more likely to be aged less than 20 years, and this is in contrast with findings from industrialized countries where most of the nulliparae are likely to be above 20 years [5,12]. This early age of marriage and consequently first pregnancy is influenced by cultural and religious believes [7]. Several authors in Caucasians and Asians countries report an increased incidence of obstetric complications in teenage pregnancies such as pregnancy induced hypertension, low birth weight, preterm delivery, anaemia and intrauterine growth restriction [13,14]. However, some authors report that the increase risk is not due to their age but to poor antenatal care

[15,16,17]. Although, in our study these nulliparae were more likely to book early for antenatal care, the proportion of those who booked was not significantly different from that of multiparae.

There was increase risk of malarial infection among nulliparae. Over 40 % of the world's population is permanently at risk of being infected with the organisms responsible for malaria, and primigravidae are most affected due to increase parasite prevalence and density with the risk highest in the first and second trimesters [13]. During pregnancy, some of the acquired immunity becomes lost. Complications such as maternal anaemia, prematurity and low birth weight may result from malaria in pregnancy. Although anaemia and fetal macrosomia were less likely in nulliparae in this study, preterm delivery was seven times more likely in them. This finding is supported by Prakesh's systemic review and meta-analyses of parity and low birth weight and preterm birth among women of different parity [9]. Multivariate regression analysis showed that pregnancy induced hypertension is commoner among nulliparae, supporting findings from previous studies [2,17].

Previous reports have not shown consistent relationship between parity and the risk for haemorrhage [2]. A few studies which showed increased Antepartum haemorrhage in Nullipara was conducted in elderly nulliparae [3]. The finding of increase placental abruption in our nulliparous subjects may be due to hypertensive disease and other factors which are not clearly understood. Episiotomy is known to be more prevalent in nulliparae and this was demonstrated in our study which showed that episiotomy was seven times more prevalent in the primigravid women. The finding also concurs with that of Malkiel et al [8]. The increase risk of episiotomy among nulliparae may be related to the fact that they are more likely to have rigid perineum which may lead to prolonged second stage and perineal tear.

Our study showed that the risk of operative delivery- Caesarean section and instrumental delivery were not significantly higher in nulliparae. This finding is in contrast with reports from several studies which found increased risk of operative delivery among nulliparae [18-20]. The reason for our finding is not clear. However, the frequency of prolonged pregnancy found in nulliparae was low. This low rate might be responsible for the reduced operative delivery as prolonged pregnancy is a known indication for induction of labour with consequent increased risk of operative delivery [19].

5. CONCLUSION

Nulliparae are at increased risk of malaria, malpresentation, abruptio placentae, preterm labour and pregnancy induced hypertension. They are however less likely to book late or have anaemia in pregnancy. These adverse factors should therefore be looked out for and excluded.

CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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