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Research Article

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Maternal and Fetal Outcomes in Low-Risk Prolonged Gestation: Astudy of Pregnancies Beyond 40 Weeks at Bugando Medical Centre Mwanza Tanzania

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ABSTRACT

Prolonged pregnancies are those that extend beyond 40 weeks and 6 days of gestation. Prolonged pregnancies, affecting up to 10% of pregnancies, pose risks to both the mother and the fetus. These risks include complications such as caesarean section and perineal tear for the mother, and outcomes like a big baby, intrauterine fetal death (IUFD), hypoglycemia, fetal death, and 5-minute Apgar scores of ≤ 6 for the baby, which are often underestimated. Emerging evidence suggests that the incidence of complications increases after 40 weeks of gestation, yet the optimal timing for delivery and mode of delivery remain subjects of debate among clinicians. (add here why this study was done).

Methodology: A hospital-based cross-sectional study was conducted in the Labor and Postnatal wards of Bugando Medical Centre. A total of 1,208 inpatients who met the inclusion criteria were enrolled. Demographic and clinical information was collected using a structured questionnaire and recorded in Epi info software version 7.2.4.0. Data analysis was performed using the same software.

Results: Among the 1,208 enrolled participants, approximately 19.57% of low-risk pregnancies experienced prolonged gestation. Prolonged pregnancies were found to be associated with the delivery of big babies. The rate of cesarean section was notably higher among prolonged pregnancies, reaching 40.3% OR 1.2[1-1.6], and this difference was statistically significant.

Conclusion: This study contributes valuable insights into the challenges posed by prolonged pregnancies and highlights the need for comprehensive guidelines and clinical strategies to address these issues, ultimately improving the outcomes for both mothers and their infants. Further research and collaboration among healthcare professionals are essential to refine management approaches and reduce the risks associated with prolonged pregnancies.

Keywords: Prolonged Pregnancy, Caesarean Section, Big Baby

Introduction

Background

Prolonged pregnancies is one that had extended to or beyond 40 weeks of gestation [1].

The prevalence of prolonged pregnancies varies by population and local management techniques. The reported rate of prolonged pregnancies in China is ranging 0.4% - 7% in all pregnancies, and the reported frequency of prolonged pregnancy is approximately 20% in India [2,3]. Based on unpublished data in Bugando medical Centre records showed that the 25-38% of pregnancy were admitted due to prolonged pregnancy and 38% among them underwent cesarean section.

Up to 45% of pregnancies are complicated by pregnancy prolongation, which puts both the mother at risk of caesarean section and the fetus at risk of intrauterine death [4]. Some retrospective studies have found that maternal and perinatal complication increases after 37-38 weeks of pregnancy and as pregnancy extends beyond 42 weeks the risk of oligohydramnios, macrosomia, fetal birth injury, meconium aspiration syndrome, and stillbirth increase significantly [5]. Also, some studies found

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that pregnancies that goes beyond 39 weeks+6 days are associated with risk of cesarean section, operative vaginal delivery, 3rd and 4thdegree lacerations, and chorioamnionitis, all these are under estimated and considered insignificant [6]. According to recent studies published on pregnancies extending beyond 40 weeks it may be advisable to induce uncomplicated pregnancies at an earlier gestation age than 41 weeks which balances between maternal and fetal outcomes as after that gestational showing increased rates of complications but in normal practice as in Tanzania ministry of health guidelines, induction of labor have to be conducted beyond 41 weeks but less than 42 weeks which may expose the women at observed poor outcomes [7-10]. In sub-Saharan countries the rate of cesarean section is approximated to be as high as 30% and the higher rates do not confer additional health gain but may increase maternal risks [11].

In Tanzania the rate of cesarean section increased from 2 % in 1996 to 6% in 2015 and other studies suggest that there is 5-fold increase annually [12].

The combination of ongoing fetal growth and stopped placental growth might result in a condition of declining placental nutritional reserve and decreased fetal circulation [13].

Though one previous study was done in Iringa Tanzania in 1989 shows that there is improved fetal outcome with post-term but recent studies report both adverse perinatal and maternal outcomes with pregnancy prolongation [10,14].

The ideal time for birth and the form of delivery is still debated among clinicians worldwide. The goal of this study is to see if there's association between prolonged gestation and poor maternal and fetal outcomes.

Methodology

Study Design

Cross-sectional study (descriptive study).

Study Duration

The study was conducted over 6 months, from 5th June 2022 to 30th December 2022.

Study Setting

The study was conducted at Bugando Medical Centre in Obstetrics and Gynecology department-specifically at the antenatal ward, C2LW, and E4.

BMC is a teaching and Consultant tertiary Referral Hospital, -Lake Zone, located in the Mwanza region at Nyamagana District. BMC operates as a zonal referral hospital with a catchment population of 14 million people from six regions which are Kagera, Geita, Shinyanga, Mwanza, Mara, and Simiyu [15].

The obstetrics and gynecology department is among the major departments at BMC offering a variety of services including ANC, Delivery, Postnatal care, and other gynecological diseases. NC services are offered by obstetricians and residents on daily basis with an average attendance of 500 pregnant women per month including both new cases and re-attendance.

Study Population

All low-risk pregnant women who deliver at term at BMC during the study period.

Determination of Gestation Age.

- On 1st day of the last menstrual period (LNMP), and recorded on the antenatal card as early as 2nd trimester correlating with fundal height.
- Gestation age by ultrasound conducted before 22 weeks.

Inclusion criteria

- All pregnant women with low risk at term and ongoing pregnancy who consent to participate in the study period
- Those who crossed the expected date of delivery
- Vertex presentation
- Sure, of dates (Certainly, our study's inclusion criteria were specifically designed to select participants who met certain menstrual history criteria. We enrolled individuals who can reliably provide information about their menstrual cycles. To be eligible for our study, participants had met the following criteria:
- **Regular Menstrual Period:** Participants should have a history of regular menstrual periods. A regular menstrual cycle typically implies a consistent pattern in the duration between menstrual periods, which is indicative of a stable hormonal and reproductive health status. This criterion helps ensure that participants have a predictable menstrual cycle, which is vital for accurate gestational age calculations.
- **Recollection of Menstrual History:** Additionally, participants were required to recall and provide information about at least their two most recent normal menstrual periods. This information includes the start date and duration of these periods. The ability to remember and report this information accurately was essential for calculating the estimated delivery date and establishing gestational age
- **Singleton pregnancy:**

Exclusion Criteria

- High risk pregnancy: previous uterine scar -This history can influence the delivery method, maternal medical condition eg hypertension, asthma, kidney diseases, heart diseases, known diabetes mellitus- These medical conditions may require specialized prenatal care and monitoring to manage potential complications and affect pregnancy outcomes

Source of the Patient

- Patients who were admitted in labor wards, antenatal wards, postnatal wards were included with consideration of inclusion and exclusion criteria.

Sample size and sampling procedure

The simple random sampling for study participants who meet the inclusion criteria was performed until the sample size was reached and the study was done every day from Monday to Sunday on maternity ward.

Sample size Was calculated by using the Leslie Kish formula: using a prevalence of 17% [16].

$N=Z^2P(1-P)/D2$

$1.96^2X0.17(1-0.2)/0.05^2= 211$

Where: Z= Z score for 95% confidence interval =1.96, P = prevalence=17%, D-tolerable error 5%n=221+15, n=236 prolonged pregnancies.

To get 100% of the prevalence of 17% the **minimum sample size was 1241**.Thus, after adding 10%of anticipated sample size of pronged gestation, we attained 236-pronged pregnancy after recruiting 1208 with low risk.

Study Variables

Independent Variables

- Social demographic characteristics
- Maternal clinical characteristics (Gestational age, Parity and number of ANC visits)

Dependent Variables

- Maternal outcomes (caesarean section, perineal tear, vacuum delivery was analyzed as individual adverse outcome)
- Fetal outcomes (NICU admission, hypoglycemia, baby weight, neonatal death)

Data management and Analysis

Participant's Recruitment

1241 participants were enrolled 33 were not sure of their date and have irregular menstrual period, 1208 women in total were included in analysis, among them 100 women their gestational age were determined by early trimester ultrasound the whole process was conducted between June 2022 and December 2022, of which 236 were prolonged pregnancy.

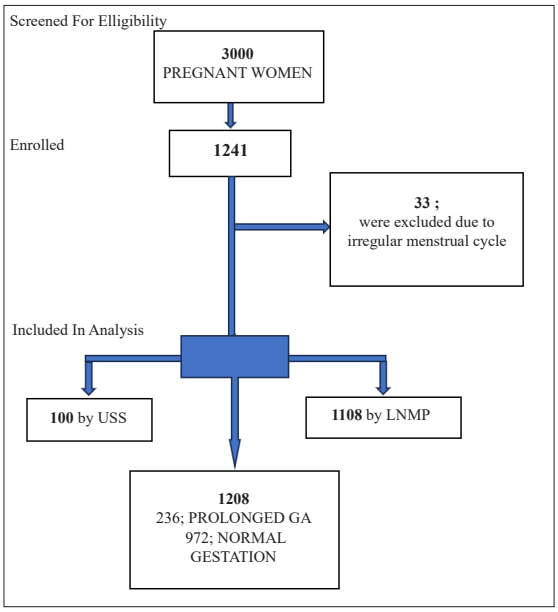

Figure 1: Recruitment Flow Chart (Strobe)

Data Collection

Data was collected using a pre-coded structured questionnaire. Variables included in the questionnaire was social-demographic variables like age, sex, marital status, place of domicile, education, occupation, parity, Other clinical data collected was gestation age, Fetal outcomes; birth weight, stillbirth, Apgar score, admission to NICU. Maternal outcomes were mode of delivery, perineal tear.

Statistic Data Analysis

Data from the study was immediately uploaded to epi nfo version 7.2.4.0. The summary of the categorical variable was summarized in proportions, frequent tables, bar and pie charts were employed. To determine whether there is a significant association between the independent and dependent (outcome) variables, chi-square (X^2) for association, odds ratio (OR), and Fisher's exact tests for statistical test were used. The logistic regression model was applied to independent variables, A p-value of less than 0.05 is deemed significant for an independent variable and if 2 or more variables are statistically significant were subjected for stratification for its significancy.

Data Quality Control

Precautions were taken to assure the study's validity:

Pre-testing was done on the data collection tool. Research assistant was trained on how to use and data collection tool. The principal investigator ensured the promptness and completeness of the data tool to make sure the edited data gathered is comprehensive and consistency.

Ethical Consideration

The CUHAS/BMC Research Ethics and Review Committee was consulted for study approval before commencement of the study with certificate number CREC / 583 /2022. BMC's Obstetrics and Gynecology Department was contacted for permission to perform this study. Participants who chose to take part were asked to complete an informed consent form. Patients feel well knowing that all information was treated in the highest degree of confidentiality. Each participant was free to refuse to participate in the study at any time, and doing so didn't affect their ability to get medical care or treatment or have an impact on an attendant's choice. This study's results will also help improve the medical care provided to these women.

Results

Social Demographics and Clinical Characteristics Study Participants.

A total of 1208 pregnant women with low risk and singleton deliveries the prolonged pregnancies were 19.57% (Figure 2). Of these, 14.57% (176) were aged 35years and above, 30.85% (372) primipara and the overall cesarean rate was 32.78% (396) Table 1 below.

Maternal Outcomes Between Normal Ga and Prolonged Pregnant Women Delivering at BMC.

Comparing prolonged prime gravida to multiparous patients, the rate of caesarean sections was higher in the prolonged group (36.02%) and higher in the prolonged prime gravida group (39.5%) and there were only 1 vacuum delivery in prime (0.08) (Figure 3 and Table 2). The Commonest indication of caesarean was arresting cervical dilatation 34.92% followed by meconium stained 27.81%.

Association of Prolonged and Fetal Maternal Outcomes.

The association of fetal and maternal outcome out of which prolonged is associated with delivery of big baby (OR3.2[1.6 - 6.4] with p value <0.001 (Table 3) Other outcomes has no association with prolonged. Then when subjected to multivariate logistic regression the delivery of the big baby was associated with prolonged with (AOR3.2[1.7 - 6.7) with p-value of <0.01 (Table 4).

Discussion

Prevalence of prolonged pregnancy is ranging between 7-20% globally and it has been associated with adverse maternal and fetal outcomes and this has been contributed by local practice and high incidence of primigravida. At Bugando Medical Centre, the average of 25-38 percent of pregnancies are admitted due to prolonged pregnancy each year, but adverse maternal and fetal outcomes have not been studied.

Prevalence of Prolonged Pregnancy

Our study revealed that the prevalence of prolonged pregnancies was 19.57%, this prevalence as comparable to a study done by Nisar et al which reported a prevalence of 20% and the similarity may be due to the same study design, recruitment cut off point for prolonged pregnancies, and management of prolonged pregnancy in both studies [3,17]. However other studies has reported higher prevalence, and this higher prevalence could be explained by the fact that, these studies has a higher number of primigravida compared to our study, as in primigravida the likelihood of having wrong dating is high compared to multipara [18,19].

Moreover, our study prevalence is higher compared to the study done in USA and Ethiopia which reported the lower prevalence of about 7% and 13% respectively [18,20]. In these studies, the enrolment cut off point for prolonged pregnancy was higher compared to our study, in which they enrolled post term (>42 weeks of GA) as prolonged pregnancy and hence the more chance to have lower prevalence. The differences may also be contributed by the differences in local practices and threshold of scheduling induction of labor (elective induction) and elective cesarean sections, which have been shown to reduce the number of prolonged pregnancies [17].

Maternal Outcomes of Prolonged Pregnancy

In our study the more chances of cesarean section were in prolonged pregnancy (36.02%) as compared in normal gestation (32.09%). However, majority of caesarian section was due to arrested cervical dilatation (30%), meconium-stained liquor (25%) and big baby (20%). This is similar to several other studies done on prolonged pregnancy which reported the same frequency of caesarian section indications [18,20,21]. This may be explained by the reasons that as the pregnancies advances the risk of meconium stained liquor increases, as it has been established that the amniotic fluid content decrease by as much as 8-9% per week after 38 weeks of GA, however, as the GA advances placental blood flow decreases hence the fetal circulating blood to sustain renal blood flow decreases and as this progresses the amount of urine produced by the fetus decreases [19]. Furthermore, reduced amniotic fluid resulting into a compression of the umbilical cord causes vagal reflex that induces the passage of meconium during cord compression [23].

Also as the pregnancies advances the fetus continues to grow resulting into macrosomia babies (weight in excess of 4 kg) and this is three to seven times more prevalent in prolonged pregnancy because the total placenta area grows, allowing for the continued exchange of nutrients to sustain fetal growth [16].

In our study, primiparous women are more likely to undergo a cesarean section than multiparous women, and the risk rises as the gestation age advances. This study is comparable to study done Aaron B, Caughey et al 2006 in which primary caesarean section was more among nulliparous. This can be explained by the fact that the tolerance toward nulliparous on a big baby delivery is very low compared to multiparous who had a previous vaginal delivery.

Prolonged pregnant imposing risk of operative vaginal delivery, though in our study only 0.08% delivered by vacuum and this may be due to lack of comfortability and expertise on the instrumental and patient perception on the operative vaginal delivery which differ in other countries setting in which the risk of operative vaginal delivery is higher (10.7-15.4%) [24].

Fetal Outcomes of Prolonged Pregnancy

The rate of NICU admission and intrauterine fetal death, APGAR score less than 7, hypoglycemia, and neonatal death is similar to a previous study on fetal risk as gestational age advances in which there is no significant difference on perinatal risk as gestational advances. There is no difference in fetal complications between prolonged pregnancy and normal gestation age [25]. Several studies have demonstrated that late-term and postterm pregnancies are associated with an increased risk of perinatal morbidity and mortality and delivery after expected date of delivery also was associated with a significant increase in the rate of neonatal intensive care unit admissions which makes our study different due to the cutoff for gestational age at intervention which is lower compared to study done on post-term [26,27].

Association of Prolonged and Maternal- Fetal Outcome

Our study found an association between prolonged pregnancies and having a big baby, which is a factor that increases the likelihood of a caesarean section. Specifically, prolonged pregnancies were found to have three times the odds of having a big baby compared to normal GA. This finding aligns with another study that reported a twofold increased risk of macrosomia in prolonged pregnancies [28]. However, our study did not find a significant association between prolonged pregnancies and caesarean section or perineal tear [29-35]. This lack of association may be attributed to the small sample size used in the study, which could limit the statistical power to detect such associations [36-45]. It's worth noting that this result differs from other studies that had larger sample sizes and different study designs, which might have detected a significant association between prolonged pregnancies and caesarean section or perineal tear [46-55].

Study limitations

1. Most ultrasound diagnosis is done at late gestation age; the majority of patients had their estimated gestational ages determined by the last normal menstrual period and hence a challenge of information bias was not avoided [56-60].
2. These study findings cannot be generalized to high-risk pregnancy since this study involved only low risk group [61-65].

Conclusion

Our findings show that there is association of prolonged pregnancy with big baby deliveries, which increases chances of caesarean section in primigravida. Therefore, the intervention of primigravida women should begin as early as 40 weeks with a well-dated early ultrasound.

Recommendations

1. The intervention of primigravida women with prolonged pregnancy should begin as early as 40 weeks with a well-dated early ultrasound.
2. First trimester ultrasounds should be made available to all pregnant women, ideally between 11 and 14 weeks along, as they offer a more precise estimate of gestational age than the last menstrual period and reduce the number of pregnancies that go beyond 41+0 weeks.

Table 1: Social Demographics and Clinical Characteristics Study Participants.

Variables (N)	Frequency (%)
Maternal age in years(n)	
<20(1)	0.08
20-35(1031)	85.35
>35(176)	14.57
Education	
Formal (1185)	98.09
Informal (23)	1.90
Occupation	
Employed (261)	21.71
Self-employed/business (385)	32.03
Others*(556)	46.26
Marital status	
Married (1152)	95.36
Single (52)	4.30
Others++ (4)	0.33
Parity	
Primiparous (372)	30.85
Multiparous (834)	69.15
Mode of delivery	
SVD (811)	67.14
Caesarean section (396)	32.78
Vacuum/forceps (1)	0.08
Birth weight (kg)	
LBW <2.5(37)	3.06
Normal BW 2.5-4(1136)	94.04
Big baby >4(35)	2.90

Others* means peasant, housewife: Others++ means widow, divorce

Table 2: Mode of delivery by Parity Across Gestational Age

Gestational age	Parity					
	Prime Parous (372)			Multiparous (834)		
	C/S (%)	SVD (%)	vacuum	C/S (%)	SVD (%)	vacuum
Normal GA (970)	96 (33.1)	194 (66.8)	1 (0.1)	215 (31.8)	462 (68.2)	0 (0.0)
Prolonged (236)	32 (39.5)	49 (60.5)	0 (0.0)	53 (34.2)	102 (65.8)	0 (0.0)

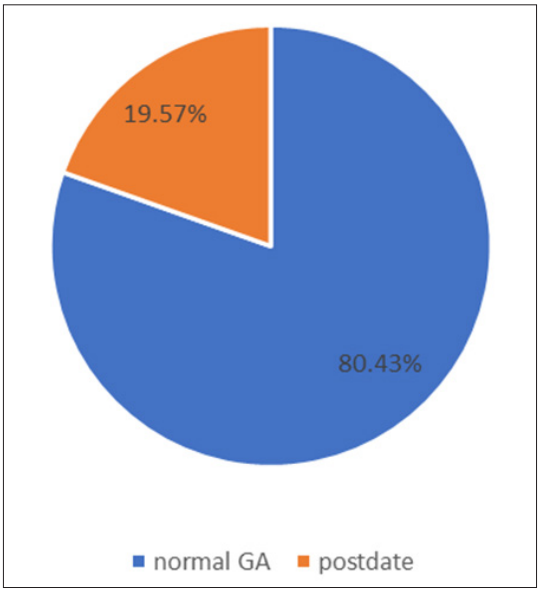

Figure 2: Prevalence of prolonged pregnancy

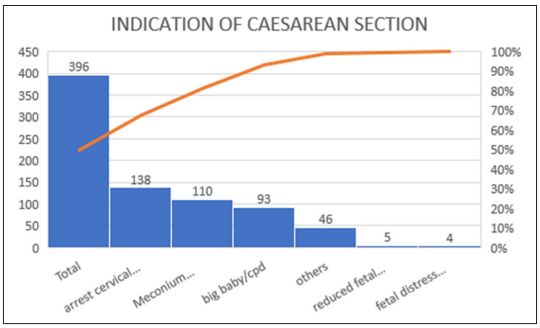

Figure 3: Indication of Cesarean Section

Table 3: Association of Gestational Age with Maternal -Fetal Outcomes

Outcome	Prolonged		Bivariate	
Fetal Outcome	No	Yes	OR [95%CI]	p-value
Big baby				
No	952 (98.1%)	18 (1.9%)	1	
Yes	227 (96.2%)	9 (3.8%)	3.2 [1.6 -6.4]	<0.001
IUFD				
No	959 (99.0)	10 (1.03	1	
Yes	233 (98.7)	3 (1.3)	1.2 [0.3 - 4.5]	0.750
NICU admission				
No	916 (94.5%)	53 (5.5)	1	
Yes	223 (94.49	13(5.1)	1.0 [0.5 -1.9]	1.000
Hypoglycemia				
No	967 (99.8)	2 (0.2)		1.000

Yes	236 (100)	0 (0.00)	-	1.000
APGAR≤6				
No	946 (97.5)	24 (2.47)	1	
Yes	232 (98.3)	4 (1.7)	0.6 [0.2 -2.0]	1.000
Maternal Outcomes				
Cesarean section				
No	658 (67.9)	311 (32.1)	1	
Yes	151 (64)	85 (36.0)	1.2 [0.9 -1.6]	0.2

Table 4: Association of Birthweight in Bivariate and Multivariate Analysis

Variables	Birthweight		Bivariate		Multivariate	
	<4KG	≥4KG	OR[CI]	P-Value	AOR[CI]	P-value
Maternal age						
<35	1006(97.6%)	25(2.4%)	1.0			
≥35	166(94.3%)	10(5.7%)	2.4(1.4-5.1)	0.017	2.1[0.9-4.4]	0.068
Parity						
Multipara	805(96.5%)	29(3.5%)	1.0			
Prime parous	366(98.4%)	6(1.6)	0.5[0.2-1.1]	-	-	-
Gestational age						
Normal GA	950(97.9%)	20(2.1%)	1.0			
Prolonged	221(93.6%)	15(6.4%)	3.2(1.6-6.4)	0.001	3.3[1.7-6.7]	<0.001

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