ORIGINAL ARTICLE

Maternal characteristics and timing of presentation following pre-labour rupture of membranes

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ABSTRACT

Background: To examine the influence of maternal characteristics on timing of presentation for intervention following pre-labour rupture of membrane (PROM) at term. **Materials and Methods:** This was a descriptive study of cases of term PROM with singleton births at the University of Benin Teaching Hospital (UBTH) from October 2011 to December 2012. Interval from onset of PROM to presentation to hospital was used as dependent variable. From the study population, two groups were identified based on time interval (≤24 hours or >24 hours) from PROM to presentation to hospital and their relationship to socio-demographic characteristic examined. **Results:** Over the study period, records of 110 women met the inclusion criteria and were selected for analysis. Their mean age was 29.26 ± 0.67 years; they were all married with 41.8% being nulliparous women. The mean gestational age at presentation with PROM was 38.5 ± 1.2. Over 50% had tertiary level of education. Overall, 38.2% were in social class 1. With regard to maternal response behaviour to PROM, 65.5% presented to the hospital within 24 hours while 34.5% presented after 24 hours of rupture of membranes. Majority of those that presented within 24 hours of PROM were in (upper) social class 1 and 2 and this differed significantly from those that presented after 24 hours, most of whom were in (lower) social class 3,4 and 5; [56 (77.8%) vs 16 (22.2%) and 14 (36.8%) vs 24 (63.2%)] $P = 0.0001$. **Conclusion:** Delay in presentation after PROM, illustrative of maternal under utilisation of BPACR package, is associated with being in a lower social class. Socio-economic and educational empowerment of women is advocated, while prospective research on maternal perception and attitude towards ANC is proposed.

Key words: Antenatal care, maternal health, PROM, socio-demographic characteristics, social class

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INTRODUCTION

Maternal and peri-natal health remains a major public health concern especially in low resource countries. Improved maternal health is the target of the fifth Millennium Development Goal (MDG 5) measured by a reduction of maternal deaths by three-quarters, between 1990 and 2015.[1,2] An important element to achieving this goal is effective antenatal care (ANC). The goal of the ANC package is to prepare for birth and parenthood as well as prevent, detect, alleviate or manage the health problems during pregnancy that affect mothers and babies.[3,4] A key component of ANC is birth preparedness and complication readiness (BPACR) and it is a strategy to encourage the timely utilisation of skilled care during childbirth.[5-7] Uptake of BPACR have been observed to improve maternal knowledge and thus response to seeking care.[7-9] However, despite these efforts some women still do not benefit owing to some influencing factors. Previous studies have identified several factors that could influence maternal health indices, including delay in seeking care or reaching health facilities, low socio-economic status, high cost, education, negative cultural beliefs and practices and poor geographical access.[3,10,11]

In a low resource setting like ours we identified pre-labour or pre-mature rupture of membranes (PROM) as one obstetric condition that requires timely and guided intervention of a skilled attendant to avert adverse outcome and thus serves as a good surrogate to measure compliance to BPACR.[11,12] Usually spontaneous labour would follow term PROM in 24, 48 and 96 hours in 70%, 85% and 95% of women, respectively; this assumes no increased risk of infection for the baby or mother following PROM if one waits for labour to

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start naturally compared with inducing labour straight away.[12,13] Some women (particularly nulliparous women), however, have significant latency from PROM to delivery when managed expectantly, thus increasing the risk of adverse outcome.[12,13] The short-term risks of rupture of membranes include cord prolapse, cord compression, placental abruption and longer-term risks of delayed delivery include maternal and neonatal infection. Seaward and colleagues in an international multicentre study on term PROM observed that the risk of chorioamnionitis with term PROM increased from less than 10% to over 40% after 24 hours of PROM; they concluded that since risk of infection at term with PROM is small during the first 24 hours, expectant management and waiting for spontaneous labour may be considered in selected patients for the first 12-24 hours if a patient desires expectant management, however, the use of expectant management after the first 24 hours is questionable.[14] The debate (whether expectant or active) regarding management remains, hence management of term PROM requires a clear discussion with the woman, her spouse and caregivers regarding the benefits and risks of expectant management versus active management (with induction of labour); and most clinicians adopt care that suits their local situation. Our local practice at our obstetric unit is based on the findings of randomised controlled trials, which concluded that "planned early birth" (through oxytocin administration) leads to reduced maternal infections, reduced neonatal intensive and special care admissions and greater maternal satisfaction without any significant difference in mode of delivery compared with expectant management.[15,16] This recommendation influences the counselling we give to women at the antenatal clinic as part of birth preparedness and emergency readiness; on the need to present immediately to the hospital once PROM is noticed, however, some women still present late. Thus assuming baseline information on BPACR as regards PROM for all women attending the ANC clinic, we attempted to survey the profile of women experiencing term PROM and examine the influence of socio-demographic characteristics on timing of presentation to the health facility for intervention following the onset of PROM.

MATERIALS AND METHODS

This retrospective, observational study was undertaken in the Department of Obstetrics and Gynaecology of the University of Benin Teaching Hospital in southern Nigeria.

We scrutinised cases of term PROM during the period October 2011 to December 2012 and selected 'as eligible' for analysis only booked women (registered at the centre for pregnancy care and delivery) with singleton pregnancy that had regular/adequate ANC (i.e. ≥4 ANC visits with at least one visit in the third trimester).[17,18] Term PROM is defined as rupture of the membranes prior to the onset of labour at or beyond 37 weeks gestation.[12] A structured proforma was used to extract the relevant information from the selected patients' case files. Data was collected regarding socio-demographic and clinical characteristics including age, parity, marital status, religion, ethnicity, occupation and level of education of self and spouse, estimated gestational age, a previous history of pre-term PROM, pre-term birth, previous caesarean section, associated medical disorders and presence of any obstetric complications. In addition, the time from membrane rupture to presentation in labour ward was extracted from the case notes. The social class of a woman was based on her educational status and spousal occupation.[19]

The study population was classified into two groups based on time interval from PROM to presentation in hospital; group one included those that presented on or before 24 hours while group two were those who presented after 24 hours. Twenty-four hours was used as cut-off point because PROM is termed prolonged PROM after 24 hours of rupture of membranes and it is beyond this time that PROM becomes associated with significant adverse materno-foetal sequelae.[14,20,21] Comparative analysis of the socio-demographic characteristics was done between the two groups. The study protocol was approved by the ethical committee of hospital.

Data were entered and analysed using SPSS version 20.0 as appropriate. Descriptive statistics, frequencies (percentages), means and standard deviation were used to describe the socio-demographic characteristics. For comparison of data between the two groups, categorical data were analysed with chi-square test or the Fisher's exact test, while Student's *t*-test was used to analyse the difference between groups in continuous variables. *P*-value less than 0.05 was considered significant.

RESULTS

A total of 110 cases with term PROM were eligible for the study. They were mainly (94.5%) from the southern part of Nigeria and commonly of Christian religion (92.7%). Their ages ranged from 18 to 39 years with a mean age of 29.26 ± 0.67 years. They were all married and over two-fifths (41.8%) were nulliparous. The mean gestational age at presentation with PROM was 38.5 ± 1.2 weeks. Overall 57.3% had tertiary level of education, while 32.7% and 10% attained secondary level and primary level of education, respectively. In terms of social class distribution, 38.2% were in social class 1 and the least represented was social class 5 with 5.5%. Obstetric history showed that 8.2% had previous PROM, 16.4% had previous caesarean section and 4.5% were retroviral disease positive [Table 1]. Also shown in Table 1 is a breakdown of the time interval it took the women

to present to labour ward from rupture of membranes, over half of women in this study (52.7%) presented within 12 hours of rupture of membranes while a small proportion (5.5%) presented well over 72 hours. Further subdivision into groups with or without prolonged PROM showed that 65.5% presented within 24 hours while 34.5% presented after 24 hours of rupture of membranes.

Table 2 shows a comparative analysis of the social demographic and obstetric profile of the two groups. The mean age, parity and gestational age at presentation were similar in both groups. Although a history of previous PROM, a previous caesarean section and retroviral disease were more in the patients presenting within 24 hours (group 1) than in those presenting after 24 hours (group 2) the differences were not statistically significant. Majority of the women that presented within 24 hours of PROM were in social class 1 and 2 (56 [80%] vs 14 [20%]) while those that presented after 24 hours were mainly from social class 3 to 5 (16 [40%] vs 24 [60%]) and this was statistically significant, $P = 0.0007$. Additionally the association between social class and time to presentation following PROM was compared; with social class 1 and 2 as upper social class and social classes 3, 4 and 5 categorised has low social class. The results showed that a low social class had significant association with late presentation after 24 hours of PROM, $P = 0.0001$.

Table 1: Socio-demographic and Obstetric characteristics of patients with term PROM

	Frequency (n = 110)	Percentage (%)
Age		
Mean+SD	29.76 ± 0.67	
Range	1839	
Married	110	100
Single	—	—
Parity		
Para 0	46	41.8
Para 1-4	60	54.6
Para ≥ 5	4	3.6
Gestational age		
Mean+SD	38.5±1.2	
Level of education		
Tertiary	63	57.3
Secondary	36	32.7
Primary	11	10
Social class		
1	42	38.2
2	28	25.5
3	18	16.4
4	16	14.5
5	6	5.5
Previous PROM		
Yes	9	8.2
No	101	91.8
Previous caesarean section (c/s)		
Yes	18	16.4
No	92	83.6
Retroviral disease		
Yes	5	4.5
No	105	95.5
PROM-to-presentation interval		
≤12 hours	58	52.7
13-24 hours	14	12.7
25-36 hours	16	14.6
37-48 hours	12	10.9
49-72hours	4	3.6
>72 hours	6	5.5
PROM-to-presentation interval		
Within 24 hours	72	65.5
>24 hours	38	34.5

DISCUSSION

Social class has been shown in this study to influence decision making by the pregnant woman. For the immediate risk of cord prolapse or increasing risk of infection following prolonged period of latency, pregnant women are advised (as part of BPACR) to present immediately for evaluation as soon as PROM is noticed. In this study, using time from PROM to presentation to hospital as a proxy for maternal response; we observed that a considerable proportion (34.5%) of the women still presented quite late, after 24 hours of rupture of

Table 2: Comparative analysis of the socio-demographic and obstetric profile of two groups based on PROM-to-presentation interval

	Within 24 hours (n = 72)	>24 hours (n = 32)	P value	OR*	CI (95%)*
Mean age	30.3±4.7	28.7±5.3	0.094		
Mean parity	1.1±1.2	1.1±1.2	0.981		
Gestational age	38.6±1.3	38.2±1.3	0.168		
Previous prom					
Yes	6 (5%)	3 (3%)			
No	66 (60%)	35 (32%)	1.0000#		
Previous c/s					
Yes	12 (11%)	6 (5%)			
No	60 (55%)	32 (29%)	1.0000#		
Retroviral positive					
Yes	3 (3%)	2 (2%)			
No	69 (63%)	36 (33%)	1.0000#		
*Social class					
1	34 (30.9%)	8 (7.3%)			
2	22 (20%)	6 (5.5%)			
3	6 (5.5%)	12 (10.9%)			
4	8 (7.3%)	8 (7.3%)			
5	2 (1.8%)	4 (3.6%)	0.0007		
Upper [1,2]	56 (77.8%)	14 (36.8%)	0.0001 6	6	2.5-14.2
Low [3,4,5]	16 (22.2%)	24 (63.2%)			

*OR – odds ratio; CI – 95% confidence interval; #Fisher's exact test; *social class; class 1-2, upper social class; class 3-5, lower social class

membranes. This delay in presentation was found to be significantly associated with being in a lower social class, thus suggesting a link between low educational/economic attainment and response to maternal health issues. Various researchers have corroborated this finding; Moss[22] reported that, socio-economic factors that affect impoverished populations, such as education, income inequality and occupation, represent the strongest and most consistent predictors of health and mortality, while Ward[23] described poverty as the strongest predictor of insufficient pre-natal care owing to three factors that reduce access, namely socio-demographic factors (age, ethnicity, marital status and education), systematic barriers and barriers based on lack of knowledge, attitudes and life-styles. Other reports also noted that, disparity in health behaviour stem from the conditions of people's lives, including living conditions, environment, age and other social factors, and how these affect people's ability to respond to illness.[24,25] In this study the age and parity did not influence decision making as these were similar for both groups, also confounding obstetric conditions did not differ significantly between the two groups, although a numeric majority of those with previous history of obstetric events (such as, previous PROM, previous caesarean section and retroviral positive women) tended to present early after the occurrence of PROM, suggesting that past obstetric experience may have positive influence in deterring undesirable maternal response behaviour.

From the foregoing, the association between poverty, ignorance and disease remains and pregnancy is no exception. Whilst there has been considerable reduction in maternal and peri-natal mortality indicating improvement in peri-natal care and general socio-economic and educational levels in developed countries same cannot be said for developing countries. In developing countries like Nigeria, effort have been put in place in terms of policies and advocacy to improve maternal health and encourage antenatal services utilisation, however, the influence of social structure, health beliefs and personal characteristics of the users, as well as the availability, quality and cost of services still prevails.[26,27] The delayed maternal response observed in this study, despite reviewing only registered/booked women (with adequate ANC) deemed to have had access to health education during ANC inclusive of the provision of BPACR plan is worrisome. While it may be due to an overriding influence of literacy and economic status as suggested by our findings, there is the likelihood that this may also imply a lack of effective communication of BPACR package during ANC or misunderstanding of the benefits of ANC. Previous studies have suggested that ignorance of and misconceptions about the purpose of ANC, and financial constraints are the dominant underlying factors in delayed utilisation of ANC.[28,29] Similarly a study conducted in northern Nigeria observed that there was a significant association between education and ANC service utilisation.[30] Although our study did not evaluate the quality and effectiveness of the BPACR during ANC, one could hypothesise from our finding that health workers may not be conducting sufficient health education or if they do it does not influence knowledge and thus the desired behaviour change among antenatal clinic attendees. In line with this postulation, a study in Bangladesh observed that the behaviour change messages that were provided through government health interventions meant to improve knowledge and hence preparedness of community members about signs of obstetric emergencies never yielded the desired change owing to ineffective communication.[31]

Several suggestions have been advanced to improve employment of antenatal and intra-partum services by the beneficiary's (the woman). One is from a study conducted in our institution, which found that male dominance influences patients' adequate utilisation of antenatal services, and recommended that provision for the expectant fathers to attend maternity care activities will improve ANC service acceptance.[28] Other authors have identified a re-design of the communication messages and strengthening of community involvement in health programme implementation as a means to enhancing obstetric health outcomes, namely addressing the delays in seeking healthcare, decision-making process and improve utilisation of emergency obstetric care.[6,32,33] On our part, we lend our findings to existing evidence on the role of socio-economic factors on health behaviour in a developing nation to advocate for improved educational and socio-economic empowerment of women, in addition to 'focused enlightenment' of women of low social class. Also we suggest that the potential influence of the quality of ANC on maternal response behaviour/compliance with regard to BPACR should be re-appraised.

Albeit, our study has some limitations, first the sample size was small to be able to make far reaching conclusions and recommendations, we used only booked patients (of which majority as shown in the study were of high social class) this may override the actual effect of the health behaviour of un-booked patients (with a bulk of them presumably in the low social class) not within the scope of this study. Also being a retrospective study, we could not aggregate reasons volunteered by parturients why they presented late (>24 hours) after PROM as these were not clearly stated in all the case files. We also could not determine if using a checklist, the quality and effectiveness of information received on BPACR during ANC.

We conclude that the discouraging maternal and peri-natal health indices in the developing world are sustained by poor socio-economic background and a challenging healthcare system. While global concerns seeks to

appraise current pattern of obstetric service delivery to make them more effective in addressing complications of childbirth in order to improve maternal health; the social status of women and its influence on utilisation of maternal health services should not be ignored. Focus on women with low social class during ANC education, since they are at risk of prolonged PROM and associated consequences, is suggested.

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