Prevalence and Immediate Outcomes of Low Birth Weight Neonates Born of Preeclamptic Women at Moi Teaching & Referral Hospital, Kenya

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Abstract

Background: Pre-eclampsia has been linked to poor neonatal outcomes such as; stillbirth, low birth weight (LBW), prematurity and neonatal morbidities.

Objective: To determine the prevalence of LBW and immediate (within 24 hours) birth outcomes of LBW neonates born of pre-eclamptic women at Moi Teaching & Referral Hospital, Kenya.

Methods: A descriptive cross-sectional study was conducted among 364 participants (346 singletons and 18 twins). A structured interviewer administered questionnaire was used to gather data on birth weight and neonatal outcomes. Data was cleaned, coded and entered into SPSS version 22 for analysis. Descriptive statistics were computed for the prevalence of LBW and immediate birth outcomes.

Results: The prevalence of LBW was 180(49.45%). Notably, of the LBW neonates; 162(90%) were alive while 18(10%) were stillbirths. Immediate morbidities were; birth asphyxia 51(28.73%), neonatal jaundice 38(21%), hypothermia 18(7.90%) and neonatal sepsis 1(0.68%). Of the neonates that were alive; 107(59.18%) were admitted to level II nursery care, 53(29.53%) were rooming in with their mothers and 2(1.36%) had died. **Conclusion:** The prevalence of LBW and its associated mortality/morbidity among neonates born of pre-eclamptic women is alarmingly high and the nursery admissions are majorly due to birth asphyxia.

Introduction

Low birth weight (LBW), a weight of less than 2500 grams regardless of gestational age is a crucial indicator of child's vulnerability to mortality, morbidity, delayed growth and development, chronic diseases later in life and chances of survival [1, 2]. The increased neonatal mortality among LBW neonates has been attributed to susceptibility to hypoglycemia, hypothermia, birth asphyxia, trauma, respiratory disorders and neonatal sepsis [3]. For instance, Tshehla et al., (2019)[2] reported a mortality rate twenty times high among LBW compared to normal birth weight neonates. Notably, the global prevalence of LBW in the year 2015 stood at 15.5% (20.5 million neonates) with majority (91%) arising from low and middle income countries, 24% from Sub-Saharan Africa and 11% from Kenya,[4, 5]. Although Moi Teaching & Referral Hospital (MTRH), Kenya, has had a lower prevalence of LBW neonates than the national, the figures have been rising from the year 2018 with a prevalence of 8.9%, 10.73% and 11.6% in the year 2018, 2019 and 2020 respectively, (hospital statistics 2021). The cost implication to the hospital, families and society in care of LBW neonates remains a burden especially in developing countries.

Preeclampsia, a syndrome characterized by new onset of hypertension and proteinuria after 20 weeks gestation in a previously normotensive woman remains a common health problem with a global incidence of between 2 to 10%. Of concern, the health problem often goes under recognized and undertreated impacting greatly on birth weight [6–8]. Owing to acute or chronic utero-placental insufficiency, preeclampsia has been associated with intrauterine growth retardation, LBW, prematurity

and fetal death, [9, 10]. Studies indicate a prevalence of above 35% LBW, 15% perinatal mortality rate, increased risk for severe birth asphyxia, severe respiratory distress syndrome and severe broncho-pulmonary dysplasia among neonates born to preeclampsia women [2, 11–14]. Our study aimed at determining the prevalence and immediate birth outcomes of LBW neonates born of pre-eclamptic women at MTRH, Kenya.

Methods

A descriptive cross-sectional study was conducted among 364 (346 singleton and 9 twins) participants. The study excluded neonates born of women diagnosed with eclampsia and elevated blood pressure (levels above 140/90) at ≤ 20weeks gestation due to the need to terminate pregnancy and influence of superimposed hypertension on the neonatal outcomes in the latter. Interviewer administered questionnaire was developed by the first author (L.S) after a thorough review of related literature. In addition, content review was done by four experts in the field of maternal and neonatal health resulting in editing of two questions in the questionnaire. Pilot study was also conducted at MTRH among 30 participants a month prior to actual data collection. Based on the findings of the pilot study; one question was rephrased and content was revised in two questions.

A sample size of 355 was arrived at using the formula for estimating single population proportion described by Lemeshow et al, (1990) [15] and a prevalence of LBW of 36.2% [11]. Systematic sampling was employed where every 4th neonate was recruited into the study until the desired sample size was reached. Four trained research assistants (nursing staff on off duty working at MTRH) collected data on BWT, GA (gestation age), gender, mode of livery, APGAR score and immediate outcomes for LBW neonates from neonate's mothers and files. Data collected were coded and entered into Statistical Package for the Social Sciences (SPSS) version 22 database for analysis. Descriptive statistics were conducted for neonatal social demographic factors, prevalence of LBW and immediate birth outcomes.

Results

A total of 368 participants were recruited into the study. The findings revealed a prevalence of LBW of 49.45% among the participants. An analysis of the LBW participants (n = 180) found that 99(55%) were preterm, 102(56.7%) were males, 18(10%) were twins and 107(59.44%) were delivered via caesarean section. (Table 1).

Table 1
Neonatal Characteristics (n = 180)

Variable	Category	Frequency	Percentage
Gestation at birth	< 37 weeks	99	55.00
	≥ 37 weeks	81	45.00
Sex	Male	102	56.67
	Female	78	43.33
Child is twin	Yes	18	10.00
	No	162	90.00
Mode of delivery	C/S	107	59.44
	Normal	73	40.56

The mean APGAR scores were 6.44 (± 2.773), 7.23 (± 3.089) and 7.66 (± 3.123) at one, five and ten minutes respectively. (Table 2).

Table 2
APGAR Scores for the LBW Neonates (n = 180)

Variable	Category	Mean	Standard Deviation
APGAR score	At 1 Minute	6.44	2.773
	At 5 Minute	7.23	3.089
	At 10 Minute	7.66	3.123

An analysis of immediate birth outcome found that at birth 162(90%) participants were alive, 17(9.44%) were fresh still births while 1(0.56%) were macerated still birth. Notably, 12(7%) participants had congenital anomalies while 67(37%) were resuscitated after birth. The neonatal morbidities were found to be as follows; 51(28.73%) birth asphyxia, 38(21%) neonatal jaundice, 18(7.9%) hypothermia, 3(1.7%) multiple morbidities, 1(0.68%) neonatal sepsis and 69(40%) none. At the end of 24 hours following delivery, the study found that 107(59.18%) of the participants were admitted at special care nursery, 53(29.53%) were rooming in with their mothers and 20(11.29%) had died. (Table 3).

Table 3
Immediate outcomes of the LBW Neonates (n = 180)

Variable	Category	Frequency	Percentage
Birth outcome	Born Alive	162	90.00
	Fresh Still Birth	17	9.44
	Macerated Still Birth	1	0.56
Congenital malformation	No	168	93.00
	Yes	12	07.00
Neonatal resuscitation	No	167	63.00
	Yes	13	37.00
Neonatal morbidities	Birth Asphyxia	51	28.73
	Neonatal Jaundice	38	21.00
	Hypothermia	18	07.90
	Neonatal Sepsis	1	0.68
	Multiple morbidities	3	1.70
	No Morbidities	69	40.00
Neonate state at the end of 24 hours after birth	Alive with mother	53	29.53
	Admitted to Nursery	107	59.18
	Died	20	11.29

Discussion

The study findings revealed a prevalence of low birth weight of 49.45% among the pre-eclamptic women. The findings are similar to other studies by Yilgwan et al., (2020)[16], Anselmini et al., (2018) [17] and Goba et al., (2019) [11] that found a prevalence of 42.2% ($p \leq 0.001$), 32.7% and 36.2% respectively. The low birth weight has been attributed to fetal under-nutrition as a result of utero-placental vascular insufficiency [18]. Consistent with our study findings, other studies have reported prematurity of more than 50% among neonates born of pre-eclamptic women [17, 19, 20]. About two thirds 107(59.44%) of the LBW neonates were delivered via caesarean section owing to non-reassuring fetal status and worsening preeclampsia or impending eclampsia. The finding is congruent with other studies that have reported caesarian section as the most common mode of delivery among pre-eclamptic women in order to mitigate against adverse perinatal outcomes [21–23]. The mean APGAR scores for the participants were consistent with other studies that have reported low APGAR scores in LBW neonates at one and five minutes compared to normal weight neonates [AOR = 0.52 (95%CI: 0.37–0.73), $p \leq 0.001$] [24–26].

Moreover, 10% of the LBW participants in the study were still births comparable to a finding of 17.7% and 8.9% by Nathan et al., (2018) [19] and Anselmini et al., (2018) [17]. Preeclampsia has been reported to pose a significant risk for intrauterine fetal demise due to placental insufficiency contributing to 2.1% stillbirth [27]. Similar to our study findings Kongwattanakul et al, 2018[28] that reported resuscitation of 42.7% LBW neonates born of pre-eclamptic women.

Similar to our study findings, other studies have reported birth asphyxia as the leading cause of neonatal morbidity among neonates born of pre-eclamptic women owing to lung immaturity and insufficient surfactant production [21, 22, 29]. Previous studies have however reported conflicting findings on the impact of hypertension on birth asphyxia [30–32]. The study also found that neonatal jaundice occurred in 21% of the participants similar to findings by Boskabadi H. et al., (2020) [33] that reported 30.9% and other studies that reported an increased risk of developing jaundice among LBW born of pre-eclamptic women [34, 35].

Our study findings on state of the participants at the end of 24 hours after birth is congruent to a study by McKenzie & Trotman, (2019) [36] that established that 60% of the LBW neonates born of pre-eclamptic women were admitted to neonatal unit, 24.2% were rooming in with their mothers and 15.8% had died.

Conclusion

The prevalence of LBW and its associated mortality/morbidity among neonates born of pre-eclamptic women is alarmingly high and the nursery admissions are majorly due to birth asphyxia.

Declarations

Ethics approval & consent to participate; the study was approved by the Institutional Research & Ethics Committee (IREC) of Moi Teaching & Referral Hospital; approval number 0003815. In additional written informed consent was obtained from the mothers prior to data collection.

The authors declare that all methods were carried out in accordance with relevant guidelines and regulations for research.

Consent for publication; Not applicable.

Availability of data and materials; the datasets used and/or analyzed during the current study ate available from the corresponding author on reasonable request.

Competing interest; the authors declare that they have no competing interests.

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Authors contributions; All authors participated in proposal development, result analysis, discussion and conclusion. In addition the authors read and approved the final manuscript.

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