



Case Report

Risk Factors for Early Neonatal Mortality at Souissi Maternity Hospital, Rabat, Morocco

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Summary

Background: Neonatal mortality is a major contingents of infant mortality in developing countries. This study was conducted to identify the determinants of early neonatal mortality.

Patients and Methods: A prospective, descriptive study was conducted at Souissi Maternity Hospital over a 1-year period from January 1 st, 2015 till December 31 st 2015 occurring in the national reference center in neonatology of the University Hospital Center of Rabat.

Results: 21.4% of newborns died within the first 7 days of life (early neonatal mortality). Neonatal factors significantly associated with a higher risk of neonatal death were, the Apgar score less than 7 (OR = 2.65; 95% CI (1.038-6.768); p = 0.042), low birth weight (OR = 0.003; 95% CI (0.0001-0.031); p = 0.001), prematurity (OR = 16.65; 95% CI (3.373-82.242); p = 0.001), and neonatal infection (OR = 8.66; IC 95 % ((2.156-34.846); p = 0.002). Regarding mother's profile, birth intervals less than two years (OR = 9.2; 95% CI (2.666-31.79) ; p = 0.001), and being a housewife (OR = 0.25; 95% CI (0.082-0.77); p = 0.001) are associated with neonatal deaths.

Conclusion: Neonatal mortality rate remains high, although efforts have been made to reduce it. Different risk factors associated with neonatal mortality have been identified. Addressing these factors could reduce neonatal deaths in low resource settings.

Introduction

Neonatal mortality remains a major worldwide public health problem. In general, it reflects the living and socioeconomic development conditions, the access to health services, the quality of the services and the maternal and child healthcare resources available. Neonatal deaths account for more than 60% of newborn deaths before the first year of life [1]. It is composed of early neonatal mortality where death occurs within the first seven days of life and late neonatal mortality expressing the occurrence of death from the 8th to 27th day of life. The early neonatal period is very critical because almost two thirds of these deaths occur during this period [2]. Reducing neonatal mortality is imperative to reduce infant mortality [3]. Africa has the highest neonatal mortality rate estimated at 45 deaths per 1,000 live births compared to 5 deaths for developed countries. [4]. One of the indicators of a country's

level of development is infant mortality. Its reduction is one of the Millennium Development Goals (MDGs). The aim of this study was to identify risk factors for early neonatal death at Souissi Maternity Hospital, Rabat, Morocco.

Methods

A prospective, descriptive study was conducted at Souissi Maternity Hospital over a 1-year period from January 1 st, 2015 till December 31 st 2015 occurring in the national reference center in neonatology of the University Hospital Center of Rabat.

This center, located in the city of Rabat, capital of Morocco, represents the national and regional reference center according to the health system of Morocco. He receives from all regions of the kingdom and whose annual number of deliveries is estimated at an average of 13,000. He has a resuscitation unit, intensive care unit

and a kangaroo unit.

Cases were consists of all newborns admitted to the neonatal service during the study period. We excluded all children over 28 days old, as well as all newborns whose medical records were unusable. The sampling was exhaustive. In this study, we tried to collect the maximum amount of data from the archived files and the files of newborns in the neonatology department.

Factors analyzed were the maternal risk factors (age, parity, profession, maternal pregnancy pathologies, and mode of delivery), and neonatal factors (gender, birth weight, APGAR score, diagnosis admission, and age of death).

Statistical analyses were performed using SPSS version. A conditional logistic regression model was used to calculate the crude odds ratio and adjusted odds ratios with 95% confidence intervals for any association with neonatal death. The χ^2 test was used for the comparison of the proportions. $P < 0.05$ was considered statistically significant.

Results

Characteristics of the Sample

A total of 154 cases of neonatal death were included in the main analysis of this study. 33 (21.4%) died before the 8th day of life (early neonatal mortality). Regarding the newborns, there was a higher proportion of males among the deaths 95(61.7%), with a sex ratio of 1.25. Thirty one (20.1%) mothers of newborns were less than 20 years old, 84 (54.6%) between 20 and 40 years. It was noted that 73 (47.4%) mothers had a primary schooling education, 50 (32.5%) a secondary schooling education, and 31 (20.1%) a higher schooling education (Table I).

characteristics	Number	Percentage
Maternal age(years)		
< 20	31	20.1
20-30	38	24.7
30-40	46	29.9
>40	39	25.3
Mother's profession		
Housewife	93	60.4
Executive	18	11.7
Official	43	27.9
Maternal schooling		
primary	73	47.4

Secondary	50	32.5
Superior	31	20.1
Delivery type		
Vaginal		61
Cesarean		39
Antenatal care visits		
> 4 (reference)	49	31.8
None	36	23.4
1-4	69	44.8

Table I: Demographic and clinical characteristics of the mothers of the infants who died within 28 days.

Antenatal and Perinatal History

With regard to the pregnancy characteristics ,105 mothers (68.2%) did not follow their pregnancies or did not follow their pregnancies well (Table II), 62 (40.3%) were primiparous and 140 (91%) had mono-fetal pregnancies. Regarding the perinatal history, the cesarean section rate was 39%. Cephalic presentation was the most frequent with 137 (89%). Other presentations represented 9.7%, 1% and 0.3% respectively for the seat, transverse and shoulder presentations. Amniotic fluid was clear in 70% of the cases, meconial in 13% of the cases, tinted in 17% of the cases.

Variables	Number	percentage
Gestational age at birth		
28-31	28	18.2
32-36	90	58.4
>37	36	23.4
Birth weight		
<1500g	35	22.7
1500-2500g	69	44.8
>2500g	50	32.5
Sex		
Male	95	61.7
Female	59	38.3

Preterm rupture of membranes	50	32.5
Yes	104	67.5
Non		
Apgar score		
<7	24	15.6
>7	130	84.4
Age de deces		
0-6 days	33	21.4
7-10 days	121	78.6

Table II : Clinical and delivery variables for infants who died within 28 days.

Determinants of Early Neonatal Mortality

Table III presents the results of associations between early neonatal mortality and the characteristics of newborns. Apgar score, birth weight, gestational age, birth asphyxia, neonatal infection are significantly associated with early neonatal mortality.

Neonatal factors	Number =154	OR (IC 95%)	P value
Sex		1.45 (0.66 - 3.17)	0.34
Male	95		
Female	59		
Apgar score			
<7	24	2.65 (1.038-6.768)	0.042
>7	130		
Birth weight			
<1500g	35	0.003 (0.0001-0.031)	0.0001
1500-2500g	69	0.684 (0.060-7.755)	0.759
>2500g	50		
Gestational age at birth			

28-31	28	0.034 (0.009 - 0.135)	0.0001
32-36	90	1.482 (0.406 - 5.408)	0.551
>37	36		
Final cause of death			
Birth asphyxia	29	0.871 (0.31-2.445)	0.792
Immaturity	43	16.65 (3.373-82.242)	0.001
Infections	35	8.66 (2.156-34.846)	0.002
Congenital abnormality	13	9.75 (1.116-85.163)	0.039
Rhesus incompatibility	5	0	0.999
hyaline membrane disease	29		

Table III: Proportion of deaths according to the characteristics of newborns.

Table IV shows the relationship between the profile of mothers with early neonatal mortality. Regarding mother's profile, antenatal care visits, birth intervals less than two years and the profession are significantly linked to early neonatal mortality. Mothers with a birth intervals less than two years and women who stay at home have a higher proportion of infants who die early.

Maternal factors	Number	OR (IC 95%)	P value
	154		
Maternal age(years)			
< 20	31	0.029 (0.007-0.121)	0.0001
20-30	38	0.55 (0.122-2.483)	0.437
30-40	46	1.83 (0.29-11.574)	0.519
>40	39		
Antenatal care visits			
> 4 (well followed)	49	2.95 (0.32-27.27)	0.34
None	36	0.018 (0.005-0.063)	0.0001
1-4(not well followed)	69		
birth intervals			
< 2 years	81	9.2 (2.666-31.79)	0.0001

>2 years	73		
Mother's profession			
Housewife	93	0.25 (0.082-0.77)	0.016
Executive	18	0.821 (0.136-4.936)	0.829
Official	43		
Maternal schooling			
primary	73	0.183 (0.051-0.658)	0.009
Secondary	50	1.67 (0.317-8.893)	0.543
superior	31		
Preterm rupture of membranes			
Yes	50	0.052 (0.019-1.141)	0.0001
Non	104		

Table IV: Proportion of deaths according to the profile of mothers.

Discussion

The retrospective study was carried out at a tertiary hospital, the majority of the data was well informed. However, for some mothers transferred from the surrounding health centers, prenatal consultation books were unavailable, making certain prenatal and birth data inaccessible. Thus, the results obtained remain valid for the purposes of the study and do not reflect the situation in the general population. They will constitute reference data for the next studies.

Early neonatal mortality is estimated at 21.4%. The study conducted at the maternity of tertiary care hospital in Dakar showed a similar result with 27.4% of deaths in early neonatal period [5].

Regarding mother's profile, the absence of or inadequate prenatal care, birth intervals less than two year has been highlighted as an important risk factor associated with neonatal death. Mohammad et al revealed that inadequate prenatal care is one of the common causes of neonatal mortality [6]. Similarly, the risk of obstetric complications tends to increase with multiparity and thus increases the risk of neonatal mortality. A small birth intervals less than 24 months has also been associated with an increased risk of neonatal mortality [7,8]. The heavy workload and the insufficient income of housewives imply a poor condition of mothers during

pregnancy, thus causing a complication during childbirth.

Maternal age under 20 was a risk factor ($p = 0.0001$). However, age over 30 was not associated with this mortality. These results corroborate those of Merger et al. in 2001 who showed that the neonatal mortality rate is higher in younger women. In addition Blondel and Bréart in France in 1999 show that the risk of death, compared to a woman of 20 years, was multiplied by 3 between 35 and 39 years, by 5 between 40 and 44 years and by 15 after 45 years.

Newborns from mothers with low education were a risk factor (0.009). Several authors [9-11] showed that mother's illiteracy is a very important risk factor for neonatal mortality. Indeed, educated mothers tend to have good prenatal care, a healthy lifestyle and food, easy access to quality health care and better know the danger signs in the baby.

We did not find any difference in mortality between the two sexes, while other studies have shown that males are a risk factor for neonatal mortality [12-14]. Birth weight is one of the best indicators of a newborn's chance of survival. Studies have shown that there is a strong correlation between neonatal mortality and low birth weight [15].

The Apgar score reflects the vitality conditions of the newborn and is directly related to the quality of the delivery care. The score at 1 minute of life expresses the conditions of the pregnancy and the birth, while the index at 5 minutes reflects the care provided during the birth and postpartum, and the influence of factors that act even before birth. That Apgar score between zero and six at 5 minutes was strongly associated with neonality mortality ($p = 0.042$). Several studies have shown a strong association between early neonatal mortality and low Apgar score [16].

A significant number of deaths are recorded among mothers whose gestational age was less than 28 weeks of gestation. The association between low birth weight and death in this study reinforces this hypothesis. Indeed, these low birth weights are most often encountered either in premature babies or in newborn babies whose evolution of pregnancy had experienced some dysfunctions. Several authors in Africa [9,12,17] and Asia [18,19] have reported the same findings. To prevent the death of low birth weight babies and improve their survival, some authors [9] recommend the promotion of adequate nutrition for the mother and the prevention and management of infection during pregnancy.

The causes are numerous and there may be an entanglement of several factors. The three main direct causes of neonatal mortality in Africa are, prematurity, neonatal infection and neonatal asphyxia [20]. In our series, the predominant etiologies were in order of frequency as follows: prematurity, infections, and malformations. In his study, Ngoc indicated that 42% of neonatal

mortalities were associated with prematurity, 23% with asphyxia and 13% with congenital anomalies [21]. Edmond [22,23] reported that birth asphyxia was responsible for 42% of neonatal deaths, while prematurity and infection were each responsible for 24% of neonatal mortality.

Conclusion

Neonatal mortality, a good indicator of child health, constitutes a real drama in the poorest populations of each country. The determinants of early neonatal mortality identified in this study are avoidable through better monitoring of pregnancy and good management of childbirth. These activities are already included in the existing maternal and child care programs in Morocco. Reinforcement of monitoring before and during pregnancy, during childbirth and even during the postpartum period; as well as effective management of the newborn in the first week of life, should improve the neonatal prognosis.

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