

Predictive factors of neonatal mortality in intensive neonatal care unit at Goma Eastern Democratic Republic of Congo

Abstract

Background: The neonatal mortality rate is still significant public health problem in Sub-Saharan Africa countries and major contributor to higher under-five deaths globally. Objective of this study was to identify and analyze the different maternal and neonatal risk factors associated to neonatal mortality in our study environment.

Methods: This research was case-control study from January 1st, 2010 to December 31, 2013. It was conducted at intensive neonatal care unit of North-Kivu Provincial Hospital, in Goma, Eastern Democratic Republic of Congo. Case were neonatal deaths (n=183) and control group were twice infants born alive immediately following or preceding the case (n=366).

Results: Intra-hospital neonatal mortality rate was 19.7%. Analysis of the various risk factors associated with newborns revealed that the gestational age of the newborn <37 weeks OR=1.13 (0.79-1.61), low birth weight <2500gr OR=1.01(0.71-1.43), Apgar score <7 OR=1.01 (0.64-1.84), referral neonates OR=5.12 (3.40-7.71) are real predictor factors of neonatal mortality. Maternal age, less than 18 and more than 35 years OR=9.65 (5.34-17.04), maternal occupation housewife OR=13.41 (6.63-27.11); maternal education level low OR=4.3 (2.86 -6.47) are real maternal determinants of neonatal deaths.

Conclusion: This study noted that neonatal mortality was influenced by preventable maternal factors (age, antenatal visit care; urogenital infection and poverty) and also, neonatal factors (low birth weight, sex and newborn age). According to quality prenatal, natal and postnatal care would reduce the rate of neonatal deaths in our area study.

Keywords: risk factors, newborn, neonatal death, survival

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Introduction

The millennium Development Goals (MDGs) in 2015 have not been achieved.¹ Neonatal death is defined as newborn death occurring within the first four weeks after birth.^{2,3} The first 28 days of life or the neonatal period is most vulnerable time for child's survival. Globally 2.5 million children died in the first month of life in 2017. 1 million dying on the first day and close to 1 million dying within the next six days.⁴ A vast majority of global neonatal deaths take place in the developing countries while approximately 70% of these deaths occur in just two World Health Organization: Africa and south-East Asian.^{5,6} In Sub-Saharan Africa alone 1.2 million newborns died every year equivalent to 13 000 deaths per days or almost nine death every minutes.^{7,8} 50% of neonatal deaths occur in just five countries: Nigeria, Democratic Republic of Congo, Ethiopia, Tanzania and Uganda. Majority of neonatal deaths in this part of Africa occur at home,⁹ in rural communities,¹⁰ among the poor and poorest,¹¹ less educated,^{12,13} and in war regions.¹⁴⁻¹⁶ Also causes and risk factors of neonatal death vary by country with the availability in relation with quality of health care.¹³ Democratic Republic of Congo, ranks second among Africa countries with higher neonatal mortality rate more than 28 per 1000 live births.^{17,18} Understanding those neonatal mortality factors is crucial to realize sustainable development goal in this country. Objective of this study was undertaken to assess maternal and neonatal risk factors of neonatal deaths in Goma, East Democratic Republic of Congo.

Methods and material

This retrospective case-control study was conducted at intensive neonatal care unit of North-Kivu Provincial Hospital, in Goma, Eastern Democratic Republic of Congo, which is one of the reference health facilities child health care in this region. That neonatology unit has two sections, one for preterm infants with 11 incubators and second section for term neonates with capacity of 14 cots. The unit is taken care by 4 pediatricians, 8 general practitioner and 14 nurses' staff. This retrospective, descriptive study covering a period of four years extending from January 1st, 2010 to December 31, 2013. During our study period, 927 neonates were admitted at intensive neonatal care unit. Case was 183 neonates who died within the first 28 days of their lives in our study sites. Control group had twice the size of case group. 366 neonates survival randomly selected. Inclusion criterion was neonatal death within the study period. All neonates who died on arrival or with empty or incomplete files were excluded from the study. 17 neonates were excluded from the study. Data were collected by trained from medical records in both case and control group. Variable of the interest was neonate's variables (sex, birth weight, Apgar score; admission mode; causes and moment of death); maternal variables were (Maternal age, occupation; level education; marital status; antenatal care visit and urogenital infection). A Microsoft Excel-based data served as the data source for the study. The data were statistically analyzed using the spss version 20. Odds ratios were applied in this study to assess the neonatal and maternal risk factors associated

within neonatal mortality. Authorization to carry out the study, and ethical clearance were obtained from the hospital authorities and the hospital ethics committee. The data were kept confidential.

Findings

Mortality rate

During our study period, among 923 newborns was admitted in the neonatology unit; 183 newborns was died; 107(58.5%) of them were females and 76(41.5%) males. The neonatal intra-hospital neonatal mortality rate was 19.7%.

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Newborn risk factors associated within neonatal mortality

Table 1: Analysis of the various risk factors associated with newborns revealed that the gestational age of the newborn inferior to 37 weeks OR=1.13 (0.79-1.61), low birth weight<2500gr OR=1.01(0.71-1.43) are real risks factors.

Table 1 Newborn factors associated within neonatal mortality

Factors	Case	Control group		
	N=183(100)	N=366(100)	OR IC 95%	P<0,05
Age (weeks)				
<=37	90(49.2)	189(51.7)	1.13 [0.79-1.61].	S
>37	93(50.2)	177(48.3)		
Gender				
Males	76(41.5)	171(46.7)	0.86 [0.57-1.17].	S
Females	107(58.5)	195(53.3)		
Weight (gr)				
<2500	95(51.9)	189(51.6)	1,01[0.71-1.43].	S
>=2500	88(48.1)	177(48.4)		

Table 2: Apgar scoreless 7 OR=1, 01 (0, 64-1, 84), referral neonates OR=5, 12(3,40-7,71) are real also risk factors of neonatal deaths also.

Table 2 Neonates factors associated with neonatal death

Factors	Case	Control group		
	N=183	N=366	OR IC 95%	P<0,05
Apgar				
<7	14(0.77)	24(06.6)	1.08 [0.64-1.84].	S
>=7	169(98.2)	159(93.4)		
Admission				
Referral	86(47)	68	5.12 [3.4-7.71].	S
No referral	97(53)	298		
Delivery				
Caesarean	43(23.5)	120(35.2)		Protective
Eutocic	140(76.5)	237(64.8)		

Maternal risks factors determining neonatal mortality

Table 3: Maternal age, less than 18 and more than 35 years OR=9.65 (5.34-17.04), maternal occupation housewife OR=13.41 (6.63-27.11); maternal education level low OR=4.3 (2.86 -6.47) and Table 4: number of prenatal consultation<4 OR=9.59 (6.38-14.42), marital status no married OR=3.38 [2.13-5.37], anogenital infection during pregnancy OR=3.78 (2.60-5.50) and parent poverty 21.74 [13.73-34.42]are real déterminants of neonataldeaths.

Table 3 Maternal risk factors associated with neonatal mortality

Factors	Case	Control Group		
	N=183	N=366	OR IC 95%	P<0,05
Age (years)				
<18 and >35	70(38.3)	63(17.2)	2,98[1,99-4,46].	S
18-35	113(61,7)	303(82.8)		
Occupation				
House wife	174(95.1)	201(54.9)	13.41 [6.63-27.11].	S
Other	09(4.3)	165(45.1)		
Education level				
No and primary	144(78.7)	169(46.2)	4.3 [2.86-6.47].	S
Secondary and +	39(21.3)	197(53.8)		

Table 4 Mother's risk factors associated with neonatal mortality

Factors	Case	Control group		
	N=183 (100)	N=366 (100)	OR IC 95%	P<0,05
Prenatalvisit				
<=3	129(70.5)	73(19.9)	9.59 [6.38-14.42]	S
>3	54(29.5)	293(80.1)		
UGI(I)				
Present	107(58.5)	98(26.8)	3.78 [2.6-5.5]	S
Absent	76(41.5)	268(73.2)		
Marital Status				
No married	54(29.5)	39(10.7)	3.38 [2.13-5.37]	S
Married	129(70.5)	327(89.3)		
Povrety				
Yes	136(74.3)	43(11.7)	21.74 [13.73-34.42]	S
No	47(25.7)	323(88.3)		

UGI^(I), Uro-genital Infection

Discussion

Neonatal mortality rate

Neonatal mortality rate is an indicator of public health, reflects the demographic, biological; cultural and economic status of the population and also represents the growth trend and public health of population.^{19,20} During our study period 183 deaths was noted out of 927 neonates admitted to the neonatology intensive care unit. Intra-hospital neonatal mortality rate was 19, 7 %. However, this is in contrast to the Higher rates noted by others authors Nagalo K et al.,¹⁹ 28.3% and Kateng A et al.,²⁰ 36,9% This could be due to poverty and ignorance prevailing in these countries which limit access to antenatal, intra-partum and postnatal care of quality.

Risk factors associated with newborn

This study revealed statistically significant relation between newborn gestational age inferior to 37 weeks, low birth weight <2500gr Apgar scoreless 7, referral neonates. This finding corroborates findings of several authors.^{21–23} Gestational age <37 weeks is known to contribute to higher neonatal death compared with term new born and attributes this directly to specific complication like breathing difficulties, intracranial bleeds neonatal sepsis, hypothermia and jaundice.²⁴ Also Li et al.,²⁵ fund a relationship between five minutes Apgar score, which is predictive value for infant death of both very preterm, preterm and term newborns in post neonatal period. They concluded that the Apgar score could still be a good and convenient predictor of neonate's death. Preterm and post term are unable to adjust extra uterine life and are exposed to specific neonatal complications.

Maternal risk factors associated with neonatal death

The Results of the curent study showed that the maternal age, less than 18 and more than 35 years, housewife, uneducated monther, insufficient antenatal care, marital status, anogenital infection during pregnancy and poor socio-economic status are real déterminants of neonataldeaths. Similar results was observed by others authors.^{25–27} A common supporting argument is that maternal education increases mother's knowledge about child health and health care services, thereby improves health care seeking behaviours for their children and themselves contrary to the widely held expectation, more training programs should be provided to improve the neonatal health care in mothers. Also, employed mothers should be encouraged to spend more time before and after childbirth.

Conclusion

The neonatal mortality was influenced by maternal and newborns factors which related to prenatal, natal and postnatal care. Such factors are reducible through health sector action. A correct-take care of the pregnancy and the new born in his first week of life should improve the vital prognostic neonatal. The current study findings could be utilized to determine priorities, planning, evaluating of services, and improving the health care for mothers and the neonates.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

All authors participated to collect the data, performed the statistical analysis; wrote the draft of the paper and were involved in critically revising the manuscript for important intellectual content. All authors read and approved the final manuscript.

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