



Article Original

Mortality of Low Birth Weight Neonates in a Tertiary Care Centre of Yaounde (Cameroon)

Mortalité des nouveau-nés à faible poids de naissance dans une structure de santé de référence de Yaoundé (Cameroun)

Suzanne Sap Ngo Um^{1,2}, Serge Paule Kana², Vera Ngo Njock², Grace Abondo³, Paul Olivier Koki^{1,2}

¹ Faculty of medicine and biomedical sciences of the University of Yaounde I, department of pediatrics

² Mother and Child Center of the Chantal Biya Foundation

³ Sangmelima Regional Hospital

Corresponding author

Suzanne Sap Ngo Um, email:

suzysap@gmail.com

PO Box 1364, Faculty of medicine and biomedical sciences, the University of Yaounde I

ABSTRACT

Background and objective. Neonatal mortality remains high in low-income countries. Mortality risk of low birthweight (LBW) is the highest. With aim to describe trends on mortality and death causes of LBW in a neonatal care centre in a 7 years period, we did the present study. **Methods.** We did an observational retrospective study in a single care centre. This study population comprised all LBW infants admitted to the unit, from 2009 to 2016, weighing < 2500 g irrespective of gestational age. The main outcome was the percentage of LBW infants discharged alive during the study period. We also noted the diagnosis related to death of those who died before discharge. **Results.** During the study period, 10590 newborns were admitted in neonatology unit from which 2625 (24.78%) had LBW. Nine LBW on ten were discharged alive. The main causes of death were neonatal infection, complications of birth asphyxia and congenital malformations. **Conclusion.** Mortality rate of LBW neonates in our centre is 9.1%. The main causes of death are neonatal infections, birth asphyxia and surgical emergencies. Advocacy to improve quality of care together with a strong neonatal network may be helpful to reduce in-hospital neonatal mortality.

RÉSUMÉ

Introduction. La mortalité néonatale est élevée dans les pays à ressources limitées et elle est encore plus élevée en cas de petit poids de naissance (PPN). L'objectif de ce travail est de décrire l'évolution et les causes de la mortalité néonatale dans une structure de santé de référence de Yaoundé sur une période de sept ans. **Méthodes.** Il s'agit d'une étude transversale descriptive et analytique effectuée au entre mère enfant de la fondation chant Biya de Yaoundé. Nous avons inclus tous les enfants admis dans ce centre, avec un poids de naissance de 2500 G, quel que soit l'âge gestationnel à l'accouchement. Nos variables d'intérêt étaient l'état à la sortie (vivant ou mort) et la cause du décès éventuel. **Résultats.** Au cours de la période d'étude, 10590 nouveau-nés ont été admis au service de néonatalogie et 2625 (24.78%) avaient un petit poids de naissance. La mortalité moyenne de la période était de 9.1% (8 à 24%). Les trois principales causes de mortalité étaient l'infection néonatale, l'asphyxie néonatale et les malformations congénitales. **Conclusion.** La mortalité néonatale moyenne des enfants à petit poids de naissance est de 9.1%. Les principales causes de mortalité sont l'infection néonatale, les complications de l'asphyxie néonatale et les malformations congénitales chirurgicales. Pour réduire ces chiffres, des efforts orientés vers l'amélioration des soins d'urgence aux nouveau-nés associés à une mise en réseau des structures de soins sont nécessaires.

BACKGROUND

Neonatal mortality is a public health problem especially in low resources setting, where it accounts for approximately 40% of under-five deaths [1-4]. Actions to improve newborn's survival are imperative to achieve sustainable development goals [4]. Numerous efforts have been made during the last decade resulting in a slight decrease of mortality in some countries such as Cameroon [5]. However, mortality in low birthweight (LBW) neonates remains high [6-9]. The mortality risk

of LBW is 16 fold higher than in term babies [6, 7]. Few data addressed the issue of hospital challenges regarding neonatal care in our setting. We hypothesized that, beyond prevention measures of prematurity and LBW, hospital strategies are necessary to reduce mortality. We therefore conducted this study to describe trends on mortality and death causes of LBW in a neonatal care centre in a 7 years period.

PATIENTS AND METHODS

We did an observational retrospective study at the mother and child centre of Chantal Biya Foundation. The neonatology unit has 2 separate wards for low birthweight (irrespective of gestational age) and normal birthweight respectively, aged 0 to 28 days. All the neonates come from different maternities around as the Mother and Child Centre does not have a delivery room. The number of admissions in the LBW unit is approximately 360 per year. Medical staff in this unit is made up of 2 permanent senior neonatologists, 2 general practitioners and 1 to 2 residents of paediatrics. The management protocol consisted of warming in incubators or heating tables, fasting during the first 24 hours and infusion with 10% glucose and calcium, nasal mask oxygenation when Silverman's score is greater than 3, antibiotics after blood sampling and treatment of apnea with injectable aminophylline. Other prescriptions were specific to symptoms or laboratory findings. Enteral feeding was started through nasogastric tube after oxygen weaning and through oral cup in neonates aged 34 weeks of gestation or more. Kangaroo care was proposed at the end of this intensive phase to stable neonates with weight > 1800 grams.

Data were extracted from neonatology registries from 2009 to 2016. This study population comprised all LBW infants admitted to the unit weighing < 2500 g irrespective of gestational age. We excluded all children who arrived dead at hospital. The main outcome was the percentage of LBW infants discharged alive during the study period. We also noted the diagnosis related to death of those who died before discharge.

Ethical approval was obtained from institutional ethical review board of the faculty of medicine in addition to administrative authorization from the staff of the hospital.

Epi Info version 7.0 (CDC, Atlanta) and Excel Software of Microsoft served for data analysis. We used counts and proportion to describe qualitative data and means (standard deviation) or median (interquartile range) for quantitative data.

RESULTS

During the study period, **10590** new-borns were admitted in neonatology unit from which 2625 (24.78%) had LBW. Preterm birth represented 86.28% (2265) and term babies with LBW 13.7% (n=360). Babies born from HIV infected women represented 8.68% (n=228). Nine LBW on ten were discharged alive after a median hospital length stay of 13 days with variations ranging from 1 to 60 days. The case fatality rate of LBW varied from 8.0 to 24.3% during the study period (figure 1) given a median of 9.1%.

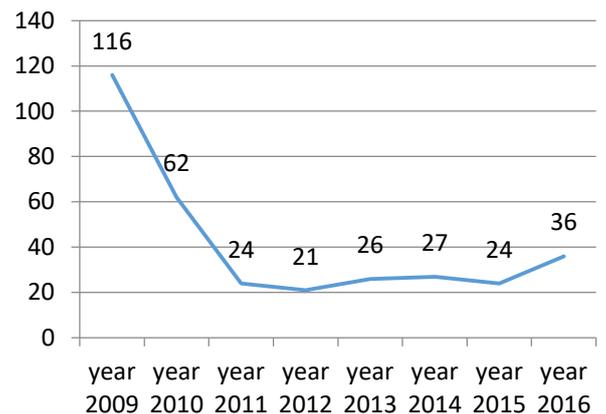


Figure 1 : Trend of mortality rate of LBW

The 3 main causes of death were neonatal infection (117), complications of birth asphyxia (52) and surgical emergencies (neonatal occlusion, oesophageal atresia). Table 1. Children born from HIV infected mothers had a higher mortality rate, 18.42% (n=42) compared to children born from uninfected mothers, 12.2% (293). We noticed that 14 (0.47%) LBW neonates died from complications of related bad feeding practices and under nutrition.

Table I : Aetiologies of death of LBW

| Item | N(%) |
|---------------------------------|-------------|
| Neonatal Infection | 177 (52.67) |
| Complications of birth asphyxia | 52 (15.47) |
| Preterm/born from HIV | 42(12.5) |
| Congenital malformations | 29(8.63) |
| Undernutrition and dehydration | 18(5.35) |
| Other | 9(2.67) |
| Kernicterus | 9(2.67) |
| Total | 336 |

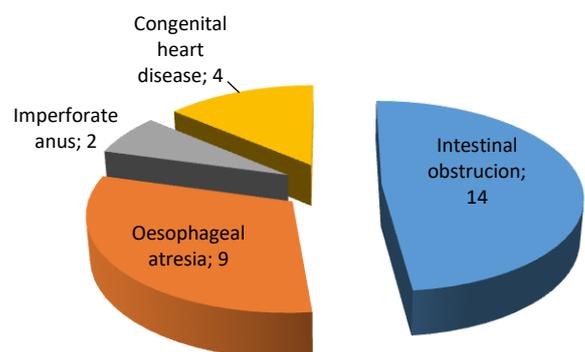


Figure 2 : Distribution of congenital malformation found in the study population

DISCUSSION

Limitations

Our study aimed to describe trends of mortality rate of LBW babies in a reference hospital in a low-income country. The definition used to define gestational age in the registry was the last declared menstrual period. In absence of ultrasound, this information might be in some cases inexact. Therefore, prevalence of term babies SGA may be underestimated. In addition, data are from a single centre and cannot be extrapolated to the whole urban area of the country. Despite these limits, the results of the present study are useful in a context of scarcity of data.

Mortality rate and causes of death

The mortality rate of LBW neonates in our study was 9.1%. This mortality rate is high compared to literature from developed countries [3, 7], but seems to be lower than data from Sub Saharan Africa [10,11] and in Cameroon [6,12]. Koki et al had 15.7% in Nord West Region of Cameroon [12] and Njom et al 54% in the same town (Yaounde) [6]. This difference may reflect variability of services and care provided to neonate in this context. Koki et al described a population in a regional hospital (level 2), made up of 54% term babies. Thus, mortality of LBW babies may be higher in their population. Although Njom et al provided data in a better setting in terms of care delivery, the difference in mortality rate may be related to their inclusion criteria. Yet, they included only babies less than 1500 gr. A similar disparity of mortality rate is found in West Africa [10, 11, 13]. Therefore, a minimal level of care is necessary to reduce LBW mortality. This includes increasing trained human resources, and kangaroo care [14].

Unsurprisingly death was due to infections, birth asphyxia and congenital malformations. Infections and asphyxia are found to particularly jeopardize neonatal health especially in resource-limited countries. [10-13] This raises the question of level of application of World Health Organisation's (WHO) standards of maternal and newborn care in our setting. [14]

Children born from HIV infected mothers appeared to have a higher mortality rate than those from uninfected mothers. In the registry, children born from HIV infected mothers constituted 12.5% of deaths. Gonzales et al showed that there is no difference between new-born of infected and uninfected women. [15]. Poor prenatal and postnatal growth have been described in this population with various explanations from in utero exposure to antioxidants,

an immune depressed child even if uninfected and an in utero exposure to antiretroviral drugs [16, 17]. Yet few data explaining higher neonatal mortality are available suggesting further studies to explain this. Challenges of management of neonatal infections are numerous in a context without health insurance: accessibility to antibiotics and adequate use of antibiotics to limit resistance. Preventive measures include proper pregnancy follow up, safe delivery and aseptic neonatal services. Few care deliveries are available in our country for congenital malformations. Recent surgical teams

provide adequate care for those with digestive anomalies (neonatal occlusion especially) but not for congenital cardiopathy. After a dramatic drop in 2010 related to increase of number of human resources, the trend of in hospital mortality was stable in from 2011 to 2016. Considering causes of death, this suggests not only an improvement in neonatal services' care but also in delivery rooms and pregnancy's follow up. Therefore a neonatal network in this setting is recommended.

CONCLUSION

Mortality rate of LBW neonates in Mother and Child centre is 9.1%. The main causes of death are neonatal infections, birth asphyxia and surgical emergencies. The trend of mortality remained stable from 2011 and 2016. Advocacy to improve quality of care together with a strong neonatal network may be helpful to reduce in-hospital neonatal mortality.

Declaration heading

Ethical approval was obtained from institutional ethical review board of the faculty of medicine in addition to administrative authorization from the staff of the hospital
No funding

No competing of interest

Author's contributions

Drafting: SS, VNN, EJM, POK

Data collection: SS, SPK, MNE

Bibliographic research: SS, VNN, EJM, FE

Reviewing: SS, VNN, EJM, SPK, FE, MNE, POK

Acknowledgements

To Dr Beckly Shu who helped for translation and English corrections

REFERENCES

1. Blencowe H, Cousens S, Oestergaard MZ, et al. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. *Lancet* 2012; **379**: 2162–724.
2. Lawn J, Kerber K, Enweronu-Laryea C, Masee Bateman O. Newborn survival in low resource settings-are we delivering? *Br J Obstet Gynaecol.* 2009;116 (1):49-59
3. You D, Hug L, Ejdemyr S. Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Inter-agency Group for child mortality estimation. *Lancet* (2015) 386:2275–86. doi: 10.1016/S0140-6736(15)00120-8
4. Liu L, Oza S, Hogan D, Chu Y, Perin J, Zhu J, et al. Global, regional, and national causes of under-5 mortality in 2000-15: an updated systematic analysis with implications for the Sustainable Development Goals. *Lancet.* 2016;388(10063):3027-35.
5. National institute of statistics and the DHS program (ICF). 2019. Demographic and Health survey of Cameroon 2018. Key Indicators. Yaoundé, Cameroon, and Rockville, Maryland, USA: INS and ICF. Available on <http://www.measuredhs.com/publications>

6. Njom Nlend AE, Zeudja C, Ndiang S, Nga Motaze A, Ngassam L, Nsoa L. Trends in neonatal mortality of very-low-birth-weight infants between 1998 and 2013 in Essos Hospital, Yaounde, Cameroon. *Arch Ped* 2016;23:895-8
7. Ray JG, Park AL, Fell DB. Mortality in Infants Affected by Preterm birth and Severe Small for-Gestational Age Birth Weight. *Pediatrics*. 2017;140(6):e20171881
8. Baer RJ, Rogers EE, Partridge JC et al. Population-based risks of mortality and preterm morbidity by gestational age and birth weight. *J Perinatol*. 2016 Nov; 36(11):1008-13. doi: 10.1038/jp.2016.118
9. Zou L, Wang X, Ruan Y et al. Preterm birth and neonatal mortality in China in 2011. *Int J Gynaeco Obstet* 2014;127(3):243-7. doi: 10.1016/j.ijgo.2014.06.018
10. Yé D, Dao L, Néboua D et al. Morbidité et mortalité néonatales de 2002 à 2006 au centre hospitalier universitaire pédiatrique Charles de Gaulle de Ouagadougou (Burkina Faso). *Cahier d'études et de recherches francophones / Santé* 2008.17 (4) : 187-191
11. Sylla M, Folquet Amorissani M, Oumar AA et al. Morbidité et mortalité néonatales dans le service de réanimation pédiatrique de l'hôpital Gabriel Touré. *Louvain médical* 2009; 128 (4) :141-4
12. Koki Ndombo PO, Mua Ekei Q, Noutakdie Tochie J et al. A cohort analysis of neonatal hospital mortality rate and predictors of neonatal mortality in a sub-urban hospital of Cameroon. *Italian Journal of Pediatrics* (2017): 43:52
13. Cissé T, Yacoubou Y, Ndiaye O et al. Time course of neonatal precocious mortality between 1994 and 2003 at the Dakar University Teaching Hospital. *J Gynecol Obstet Biol Rep (Paris)* 2006 feb;35(1):46-52.
14. WHO. Standards for improving quality of maternal and newborn care in health facilities. Geneva 2017; Available on <http://apps.who.int/iris>
15. Brahmabhatt H, Kigozi G, Wabwire-Mangen F et al. Mortality in HIV-infected and uninfected children of HIV-infected and uninfected mothers in rural Uganda. *J Acquir Immune Defic Syndr*. 2006 Apr 1;41(4):504-8.
16. Kuhn L, Kasonde P, Sinkala M et al. Does severity of HIV disease in HIV-infected mothers affect mortality and morbidity among their uninfected infants? *Clin Infect Dis*. 2005 Dec 1;41(11):1654-61. Epub 2005 Oct 27.
17. González R, Rupérez M, Sevene E et al. Effects of HIV infection on maternal and neonatal health in southern Mozambique: A prospective cohort study after a decade of antiretroviral drugs roll out. *Plos One* 2017 Jun 2;12(6):e0178134. doi: 10.1371/journal.pone.0178134. eCollection 201