**Research Article**

# EPIDEMIOLOGY OF CONGENITAL MALFORMATIONS VISIBLE AT BIRTH OF COCODY HOSPITAL

## Kouakou C., Djivohessoun A., Gro BI A., Djoman A., Mansou A., Dainguy M E., Kouadio E., Angan G and Folquet A M

Departement of Pediatric CHU Cocody, Medical School, University Felix Houphouët Boigny, Abidjan, Côte d'Ivoire

## ARTICLE INFO

## ABSTRACT

The aim of this work was to contribute to the analysis of the epidemiological aspects of congenital malformations detectable at birth.

Population and method. This was a descriptive cross-sectional study that took place from January 2018 to May 2018 (5 months) in the neonatology unit of the pediatric ward and in the delivery room of the COCODY CHU. Included were all live or dead newborns with one or more clinically detectable malformations. Variables analyzed included malformation type, anthropometric parameters of newborns, socio-demographic data of parents, obstetric data (pregnancy and parity), medical history of previous malformations, spontaneous abortion and radiation exposure. first trimester of pregnancy. The notion of taking toxic and folic acid in peri-conception period (one month before conception and during the first two months of pregnancy).

Results: The prevalence was 5 cases per 1000 births. The most common types of malformations were polydactyly, club feet, neural tube closure abnormalities, cleft lip and palate, omphalocele, and sexual ambiguity. The combination of myelomeningocele and hydrocephalus was the most common polymalformation. The sex ratio was 1.1. The malformed newborns were mostly mothers aged between 26 and 35 (49.5%), single (61.7%), housewives (28.7%), with a secondary level of education (56.7%)., 4%). The suspected risk factors are maternal fever in the first trimester (31.4%), antecedents of spontaneous abortion (23.4%), primiparity (36.6%) and the absence of peri-conceptional supplementation. folic acid (100%).

CONCLUSION: Congenital malformations are common pathologies in Côte d'Ivoire. There is no national prevention strategy.

## INTRODUCTION

According to the World Health Organization (WHO) in 2010, 270,000 deaths in the first 28 days of life were due to congenital anomalies, with neural tube defects being among the most serious and common between them. As part of an effort to reduce the number of congenital anomalies worldwide, the Sixty-third World Health Assembly adopted a resolution on congenital anomalies. This resolution encourages countries to develop technical skills related to the prevention of congenital anomalies and to raise awareness of their effects [1]. The development of a population-based surveillance program to accurately report congenital anomalies provides countries with the means to better measure the burden and risks of these conditions, to refer identified children to specialized services in a timely manner, and use prevalence estimates to evaluate current programs for prevention and clinical management. In Côte d'Ivoire, the incidence of malformations is still poorly known throughout the country due to the lack of a malformation register. In initiating this work we have set ourselves the general objective of studying the epidemiological factors of malformations. Specifically, it is a question of listing all the malformations observed at the CHU of Cocody, to identify the epidemiological factors that can explain the occurrence of these malformations.

## POPULATION AND METHODS

This is a study a descriptive cross-sectional study that took place from January 2018 to May 2018 (5 months) in the neonatal unit of the pediatric ward and in the delivery room of the COCODY CHU. We recruited and physically examined all live and dead newborns with one or more clinically detectable malformations. The variables analyzed were type of malformation, anthropometric parameters of newborns, socio-demographic data of parents, obstetric data (pregnancy and parity), medical history, previous malformations, spontaneous abortion and irradiation. in the first trimester of pregnancy.

*Corresponding author:* **Kouakou C**
Departement of Pediatric CHU Cocody, Medical School, University Felix Houphouët Boigny, Abidjan, Côte d'Ivoire

The notion of taking toxic and folic acid in peri-conception period (one month before conception and during the first two months of pregnancy).

## RESULTS

### Prevalence of visible malformations

We identified 21 cases of clinically apparent congenital malformations out of a total of 4350 births, for an overall prevalence of 5 cases per 1000 births. These malformed newborns are born of 21 mothers. Table I shows the different malformations visible at birth.

**Table I** Distribution of visible malformations according to the international classification (ICD, 2012), and according to their isolated nature and / or associated with other malformations.

| Type of Malformations | CODE CIM | Effectifs | Isolated Cases n (%) | Associated Cases n (%) |
|---|---|---|---|---|
| **Malformation Osteo Articular(33 ,3%)** | | | | |
| Polydactyly | Q69 | 1 | 1 (100) | 0(0) |
| Clubfoot | Q66.0 | 2 | 1 (100) | 0(0) |
| macrocephaly | Q75.3 | 1 | 0(0) | 1 (100) |
| ectrodactyly | Q71.6 | 1 | 0(0) | 1 (100) |
| syndactyly | Q70 | 1 | 1 (100) | 0(0) |
| **Digestive Malformations(33 ,3%)** | | | | |
| Cleft lip | Q36 | 1 | 1 (100) | 0(0) |
| Cleft lip and palate | Q37 | 1 | 1 (100) | 0(0) |
| Cleft palate | Q35 | 1 | 1 (100) | 0(0) |
| omphalocele | Q79.2 | 1 | 1 (100) | 0(0) |
| gastroschisis | Q79.3 | 1 | 1 (100) | 0(0) |
| Imperforate anal | Q42.3 | 1 | 0(0) | 1 (100) |
| macroglossia | Q38.2 | 1 | 0(0) | 1 (100) |
| **Urogenital Malformations(19 %)** | | | | |
| Sexual ambiguity | Q56.4 | 1 | 0(0) | 1 (100) |
| hypospadias | Q54 | 3 | 2(66,5) | 1 (33,4) |
| **CNS Malformations(19 %)** | | | | |
| myelomeningocele | Q05 | 1 | 0(0) | 1 (100) |
| meningocele | Q05 | 1 | 0(0) | 1 (100) |
| anencephaly | | 1 | 0(0) | 1 (100) |
| **Polymalformations  (4,7%)** | | | | |
| Myelomeningocele + hydrocephalus | | 1 | | |

### Different types of visible malformations

The visible congenital anomalies were mainly osteoarticular (33.3%), digestive (33.3%) and neurological (19%) urogenital (19%) (Table I). Mono - malformed patients accounted for 95.2% of newborns. The most common types were polydactyly, club feet, neural tube closure defects, cleft lip and palate, omphalocele, and sexual ambiguity (Table I). AFTN are the most common CNS malformations. They are represented by myelomeningocele and anencephaly. Polymerformation (4.7%) was represented by the myelomeningocele + hydrocephalus sequence.

### Characteristics of malformed newborns

Thirty-seven percent (37%) of malformed newborns are premature labor. Thirty-nine babies, or 20.6%, were born by caesarean section, the main indication of which was fetal distress. The sex ratio was 1.1. A newborn was of unknown sex. More than one-third (36.5%) of these newborns had low birth weights (less than 2.5 kg). The cranial perimeter was impregnable in case of anencephaly and the average was 33.4 cm. As for the size, it was impregnable in case of anencephaly and it was on average 47.7 cm. Table II presents the anthropometric parameters of newborns.

**Table II** Distribution by anthropometric parameters of newborns (N = 21)

| Anthropometric parameters | n=21 | % |
|---|---|---|
| Weight (kg) | | |
| <2 .5 | 8 | 38 |
| 2,5 - 3,9 | 12 | 57 |
| ≥4 | 1 | 5 |
| Cranial perimeter (cm) | | |
| < 32 | 6 | 28,5 |
| ≥32 | 14 | 67 |
| unassailable | 1 | 4,7 |
| Size (cm) | | |
| < 51 | 9 | 43 |
| ≥51 | 11 | 52, 3 |
| unassailable | 1 | 4,7 |

### Parental characteristics

The mean maternal age was 27.4 ± 5.7 years and 49.5% of the mothers were between 26-35 years old. The average paternal age was 34 ± 7.2 years, with the most represented group being 25 to 34 years (48.9%). More than half of the mothers had a high school education (56.4%). As for the occupation of the mothers, 28.7% were housewives, 27.1% were student, and 20.2% worked in the public sector. Singles accounted for 61.7% of the maternal population. More than one-third of the mothers of malformed newborns were primiparous and 29.3% were primigest (Table III). A history of spontaneous abortion was found in 20% of mothers; 6.9% had a personal history of malformation and 13.3% had a family history of malformation. Polydactyly was the most common antecedent of malformation. The syphilis, toxoplasmosis and rubella serologies had an achievement rate of 40%, 38% and 40% respectively. Three mothers had a positive result for toxoplasmosis. No patient was screened for cytomegalovirus infection. First-trimester fever was found in 31.4% of mothers with urinary tract infection as their main cause (78%). Concerning the consumption of toxic substances, 3 mothers of malformed newborns consumed toxic substances during peri-conception period (1 for alcohol, 2 for tobacco). The 2 exposures to tobacco were on a passive mode. No mother received peri-conception supplementation with folic acid. Medications taken by mothers of malformed newborns in the first trimester of pregnancy consisted mainly of iron + folic acid, sulfadoxine-pyrimethamine as a preventive treatment for malaria. Six patients admitted to taking traditional products whose composition was unknown.

**Table III** Distribution of parents of newborns by age group

| Age group (year) | | n=21 | (%) |
|---|---|---|---|
| Mother | ≤18 | 1 | 4.7 |
| | 19-25 | 8 | 38 |
| | 26-35 | 11 | 52,4 |
| | > 35 | 1 | 4.7 |
| Father | <25 | 1 | 4.7 |
| | 25-34 | 10 | 47,7 |
| | 35-44 | 9 | 43 |
| | ≥45 | 1 | 4.7 |

No mother had a medical condition described in the literature as at risk of malformation.

**Table IV** Distribution of mothers by pregnancy and parity

| Gravidity or Parity | Gravidity (n=15) | | Parity (n=21) | |
|---|---|---|---|---|
| | n | % | n | % |
| 1 | 4 | 27 | 9 | 43 |
| 2 | 5 | 33 | 6 | 29 |
| 3 | 3 | 20 | 4 | 19 |
| 4 | 3 | 20 | 2 | 9 |

### Illustrations of Some Diagnostic Malformations At Birth



**Figure 1** Cleft lip and palate in a newborn



**Figure 2** Myelomeningocele in the lumbosacral region



**Figure 3** Anencephaly in a newborn

## DISCUSSION

The overall prevalence of congenital malformations visible in our study is 5 cases per 1000 births. It is 3 to 4% of live births in the United States [2]. At the hospital of Brazzaville according to MAYANDA it represents the 5th cause of hospitalizations [3]. It was 9 cases per 1000 births according to Kamla in Cameroon [4]. It represents 1.85% of admissions in the neonatology department according to AMON-TANOH *et al*. [5]. It is lower in the Democratic Republic of Congo where Lubala *et al* found a prevalence of 6.7 cases per 1000 births [6]. This frequency is superimposable to that of the Congo. RAIN *et al*. attribute this variability to several factors, including: the census (hospital or non-hospital), geographic location, ethnic and social composition, and age of children [7]. Musculoskeletal malformations are the most common in our study with a frequency of 33.3% of all malformations. This result is similar to several studies, including that of Tchente *et al* (36.4%) [8]. Polydactyly is one of the common malformations in black subjects. Neural tube closure abnormalities (AFTN) are not uncommon in sub-Saharan black, unlike American black and Hispanic black [9]. The pathogenesis of AFTN is related to deficiencies in folic acid. It has been clearly demonstrated that folate supplementation

started prior to conception significantly decreases the prevalence of AFTN [10]. This is the case in Canada, which went from 4 cases per 1000 births in the 1980s to 0.8 per 1000 in 2007 [11]. The strict application of this strategy requires pregnancy planning. This is not the case in the Ivory Coast and, as proof, no woman has benefited from this supplementation because of the late start of prenatal consultations. This raises the question of routine supplementation in the diet. This is especially important because CNS abnormalities are common and account for a large proportion of neonatal mortality and morbidity [12,13].Digestive malformations are the second group of malformations. They are mostly represented by orofacial clefts. These malformations are visible from birth and easily identifiable. In our series, polymalformation was represented by the combination of myelomeningocele and hydrocephalus. Vigan *et al*. found a prevalence of 3.7 per 1000 births [14]. The development of antenatal ultrasound in our context could help identify this association early in order to consider a therapeutic approach. Thirty-seven percent of malformed newborns were premature and 36.5% of these newborns were small birth weights. These results suggest the role of congenital malformations in neonatal mortality and prematurity, which is in itself the leading cause of neonatal mortality [15]. The majority of malformed newborns were from mothers under 35 years of age. These results are similar to those found by Amon-Tanoh-Dick *et al* [5]. The involvement of maternal age in the genesis of congenital malformations is established only in certain chromosomal malformations and women over 35 are most at risk. Fever in the first trimester of pregnancy was found in 31.4% of the mothers of malformed newborns. It can be a teratogenic agent [16]. Regarding the prenatal check-up, the detection of Cytomegalovirus is not carried out, but this virus has been described as responsible for embryofoetopathy (microcephaly, microphthalmia, hydrocephalus, ocular lesions and late deafness) [17]. A mother of malformed newborns admitted to having consumed alcohol regularly during the periconceptional period. Indeed, it has been shown that alcohol consumption by quantity and duration is responsible for neuronal degeneration by apoptosis, via N-methyl-D-Aspartate receptor blockade and Acid receptor activation. -Gama-AminoByturique [18].

## CONCLUSION

Congenital malformations are multifactorial in origin and may in some cases be prevented by simple and accessible measures including sensitization against alcohol consumption during pregnancy and peri-conception folic acid supplementation. Determining the effectiveness of supplementation protocols has been made possible through the existence of organized, structured and rigorous malformation registers. Our results may be the starting point for the future establishment of a registry of congenital malformations that would act as a sentinel.

### Conflicts of Interest

The authors state thatthey have no competinginterests.

### Authorship

The authors have read and approved the final manuscript.

### Références

1. OMS/CDC/ICBDSR. Surveillance des anomalies congénitales  un manuel pour les administrateurs de

programme. Genève: Organisation mondiale de la Santé; 2015.

2. Hobbs C, Cleves M, Simmons C. Geneticepidemiology and congenital malformation :from the chromoe to the crib.Archives of pediatrics and adolescents medecine USA 2002 ;156;4 ;315-20

3. Mayanda H, Bobossi G, Malonga H, Djonob S, Senga P, Nzingoula S, Loukouka. Malformations congénitales observées dans le service de néonatalogie du centre hospitalier et universitaire de Brazzaville. Médecine d'Afrique noire 1991 ; 38 (7)

4. Kamla Joël Igor, Kamgaing Nelly, NguifoFongang EJ, Fondop Joseph, Billong Serge, Djientcheu Vincent de Paul. Epidémiologie des Malformations Congénitales Visibles à la Naissance à Yaoundé. HealthSci. Dis: Vol 18 (4) October - November - December 2017

5. Amon-Tanoh-Dick, Gouli j, N'gouan-Domoua, Aka j., Napon-kini h.Epidémiologie et devenir immédiat des malformations du nouveau-né au chu de Yopougon Abidjan-cote d'ivoire.Rev. Int. Sc. Méd. Vol. 8, n°2, 2006, pp. 7-12

6. Lubala TK, Shongo MY, Munkana AN, Mutombo AM, Mbuyi SM, Momat FK. Malformations congénitales à Lubumbashi (République Démocratique du Congo): à propos de 72 cas observés et plaidoyer en faveur du développement d'un Registre National des Malformations Congénitales et d'un Centre National de Référence de Génétique Humaine. Pan Afr Med J. 2012;13:1-5

7. RAIN B., BISSON J-P. Le développement embryonnaire et ses perturbations. Encycl. Méd. Chir., (Paris), Pédiatrie, 2-1975, 4002 V05

8. TchenteNguefack C, Aurore ND, Charlotte B, Esther B, Eugene BP. PrenatalDiagnosis of Congenital Malformations in Douala General Hospital. Open J ObstetGynecol. 2015; 05(15):839-48.

9. Djientcheu V. de P., Zoung-KanylBisseck AC., Njamnshi AK.: Neural tu e defects in the Africanchild : A commentar. Journal of Neurology.2009;280(1): 131-132

10. Njamnshi AK, Djientcheu V de P, Lekoubou A, Guemse M, Obama MT, Mbu R, *et al*. Neural tube defects are rare among black Americans but not in subSaharan black Africans: The case of Yaounde-Cameroon. J NeurolSci. 2008; 270(1-2):13-7. 8

11. De Wals P, Tairou F, Van Allen MI, Uh S-H, Lowry RB, Sibbald B, *et al*. Reduction in neural-tube defectsafterfolicacid fortification in Canada. N Engl J Med. 2007;357(2):135-42.

12. Djientcheu V de P, Njamnshi AK, Wonkam A, Njiki J, Guemse M, Mbu R, *et al*. Management of neural tube defects in a Sub-SaharanAfrican country: The situation in Yaounde, Cameroon. J NeurolSci. 2008;275(1-2):29-32

13. Motah M, Moumi M, Ndoumbe A, Ntieafac C, De Paul Djienctheu V. Pattern and Management of Neural Tube Defect in Cameroon. Open J Mod Neurosurg. 2017;07(03):87-102

14. Vigan CD, Khoshnood B, Lhomme A, Vodovar V, Goujard J, Goffinet F. Prévalence et diagnostic prénatal des malformations en population parisienne. Data Rev 03682315 00341-C1 8. 2008

15. OMS | Anomalies congénitales : Aide-mémoire N°370 [Internet]. WHO. 2015 [cited 2016 Jul 8]. Availablefrom: http://www.who.int/mediacentre/factsheets/fs370/fr/

16. Graham JM, Edwards MJ, Edwards MJ. Teratogen update: gestationaleffects of maternalhyperthermia due to febrileillnesses and resultant patterns of defects in humans. Teratology. 1998;58(5):209-21

17. Kaye BM, Reaney BV. Virus diseases in pregnancy: prevention and fetaleffects. ObstetGynecol. 1962;19:618-22

18. Gillerot Y, Mols M. Quinze années de surveillance des malformations congénitales dans le Hainaut et dans la province de Namur: Enseignements et recommandations. Services publics de Wallonie. 2009:1-50

**How to cite this article:**

Kouakou C *et al* (2018) 'Epidemiology of Congenital Malformations Visible at Birth of Cocody Hospital', *International Journal of Current Medical And Pharmaceutical Research,* 04(12), pp. 3940-3943.

*******