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CONGENITAL MALFORMATIONS IN THE NORTH-EASTERN DEMOCRATIC REPUBLIC OF CONGO DURING CIVIL WAR

O. L. AHUKA, R. M. TOKO, F. U. OMANGA and B. J. TSHIMPANGA

ABSTRACT

Objective: **To report on changes in the incidence of congenital malformations in a context of an ongoing civil conflict.**

Design: **Retrospective study.**

Setting: **Centre Médical Evangélique (CME) of Nyankunde, a 250 bed referral hospital, in the North Eastern Democratic Republic of Congo (DRC) during the period 1993 to 2001.**

Subjects: **A total of 8824 babies were delivered alive at our maternity; and 36 of them (0.41%) were born with a clinically diagnosed congenital malformations.**

Results: **The breakdown of the observed malformations was as follow: clubbed foot nine, congenital hydrocephalus eight, spina bifida six, cleft lip four, encephalocele two, syndactyly two, imperforated anus two, Anencephaly one, lymphangioma one, bladder exstrophy one. There was a significant increase in the annual incidence of congenital malformations ($p<0.001$).**

Conclusion: **Ongoing civil conflicts or wars ultimately have a negative impact on the incidence of congenital malformations. This is an indirect and multifactorial consequence. We conclude that ongoing civil conflict is a contributing factor to the increasing incidence of congenital malformations seen in the North-Eastern DRC.**

INTRODUCTION

Over the past decade, the Democratic Republic of Congo (DRC) has been devastated by armed conflict, resulting in unprecedented levels of poverty for the majority of the population. This crisis affects all sectors of life. While infectious diseases and malnutrition due to poverty and social upheaval remain the commonly encountered and discussed public health problems in sub-Saharan Africa (1), at the CME-Nyankunde Hospital in North-Eastern DRC, we have observed an unusual increase in the incidence of infants born with congenital malformations. We speculate that this increased incidence is at least in part explained by the loss of adequate antenatal public health services that has followed in the wake of armed conflict in the region. This paper catalogues the observed epidemiological phenomenon in order to raise awareness amongst health professionals, political leaders and policy planners, about one of many under-appreciated secondary consequences on the population subjected to continued armed conflict. In addition, in reporting this data, we comply with the World Health Organisation's call for each country to conduct surveys in order to determine the incidence of congenital malformations. Such baseline data may encourage the rational and appropriate re-introduction of preventive measures.

Congenital malformations can originate from many aetiological factors, including but not limited to genetic derangements, both single mutational and multi-factorial inheritance, and exogenous environmental and teratogenic exposures. In a woman with a normal menstrual cycle, the period of maximum teratogenicity is located between the 7th and the 63rd days after the fecundation of the ovum, which corresponds to 3rd week to the 11th after the last menstruation. During this period, organogenesis takes place and is completed; the type of malformation is directly related to the precise period during which exposure to teratogenic agent or insult took place.

MATERIALS AND METHODS

The Centre Médical Evangélique (CME) of Nyankunde is a 250-bed referral hospital located in the Irumu administrative district, the Ituri sub-region, in the Oriental Province of DRC. It comprises four major clinical services: Obstetrics-Gynaecology, Paediatrics, Internal Medicine and Surgery, and includes a laboratory for medical analysis, a central pharmacy, a nursing school, a department of community health, and a university nursing college with midwifery option. The maternity unit of the CME-Nyankunde hospital has 30 functional beds and is headed by a university graduate midwife (with a three-year university degree in midwifery), under whose supervision work midwifes of two different levels ("A3" are midwives with a two-year nursing school diploma and "A2" are midwives with a four-year nursing school diploma). This maternity unit serves as a referral for all high risks pregnancies arising in the Ituri sub-region. The annual birth rate in our maternity unit is approximately 1200.

We conducted a retrospective analysis of congenital malformations diagnosed in our hospital during the period of January 1993 to August 2001.We took into consideration all deliveries with live-births (89% were eutocic deliveries and 11% dystocic deliveries) with a birth defect detected on admission during physical examination by a trained midwife. We used Wacker's (2) definition for birth defect which includes all development defects macroscopically visible on inspection at birth or within the first week of life. The mean hospital stay for mother and infant was three days for eutocic deliveries and ten days for dystocic deliveries requiring Caesarean sections.The examination of the newborns was entirely clinical as our hospital has no access to advanced diagnostic tools (genetic studies, echocardiography, etc...), available elsewhere (5). (NB: The Nyankunde medical centre was destroyed in September 2002, during an inter-ethnic conflict.) Due to the lack of consistent follow-up, and lack of advanced diagnostic capabilities, syndromes with multiple defects without known unifying diagnosis, congenital heart defects, and congenital malformations with late onset of clinical signs and symptoms (i.e. after discharge from hospital) were not included in this analysis. To evaluate the trend over time, we used a simple linear regression statistical model.

RESULTS

Out of a total of 8824 live-births delivered in our maternity during the period of January 1993 to August 2001, 36 babies (0.41%) were born with congenital malformations, clinically present at birth or upon admission examination. Table 1 catalogues the number of observed malformations by year and as a percentage of total births for the year. Figure 1 plots the percentage of observed malformations over time. Figure 1 reveals a value of 0.0875 which represents the mean rate of annual increase. Tested by linear regression, this value was significant ($p < 0.01$). Table 2 documents the type of malformations seen each year and Table 3 catalogues them by type, revealing a predominance of central nervous system (CNS)/ neural tube defects (17 cases out of 36) (47.2%).

DISCUSSION

The frequency of congenital malformations seen in our study was 0.41%. The frequency is lower than that reported in other African reports, such as Venter *et al.*, in South Africa at 1.5% (3) and Simpkis and Lowe in Uganda at 5.4% (4). Comparison of observed frequencies of congenital malformations in different studies remains difficult due to the lack of standardisation and different methodologies available for data collection. In our study, newborn babies were examined by midwifes of different training backgrounds who generally received only enough basic medical training to enable them to deal with medical conditions in the absence of the doctor.

Table 1

Incidence of congenital malformations at the CME Nyankunde Hospital

Year	Number of live births	Congenital malformations	Ratio	Percentage	Time
1993	1083	4	0.0037	0.37	1
1994	1060	1	0.0009	0.09	2
1995	1293	4	0.0032	0.32	3
1996	1273	2	0.0016	0.16	4
1997	960	3	0.0031	0.31	5
1998	956	5	0.0052	0.52	6
1999	830	7	0.0084	0.84	7
2000	935	6	0.0064	0.64	8
January-August 2001	434	4	0.0092	0.92	9
Total	8824	36	0.0041	0.41	

Figure 1

Evolution in time of congenital malformations at the CME Nyankunde Hospital

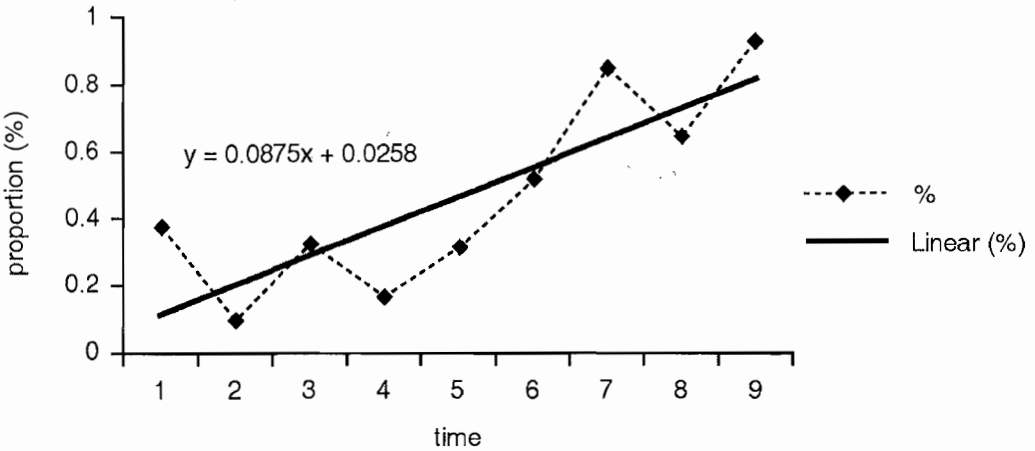

Table 2

Types of congenital malformations seen at the CME Nyankunde Hospital

Year	No of congenital malformations	Types of congenital malformations
1993	4	2 clubbed foot, 1 cleft lip, 1 hydrocephalus
1994	1	1 clubbed foot
1995	4	1 clubbed foot, 1 spina bifida, 1 cleft lip, 1 lymphangioma of upper lip
1996	2	1 syndactyly, 1 imperforated anus
1997	3	1 clubbed foot, 2 spina bifida
1998	5	1 clubbed foot, 1 imperforate anus, 1 spina bifida, 1 hydrocephalus, 1 cleft lip
1999	7	1 clubbed foot, 2 hydrocephalus, 1 spina bifida, 1 anencephaly, 1 encephalocele, 1 syndactyly
2000	6	1 clubbed foot, 3 hydrocephalus, 1 bladder exstrophy, 1 cleft lip
January to August 2001	4	1 clubbed foot, 1 hydrocephalus, 1 spina bifida, 1 encephalocele

Table 3

Congenital malformation by type

Clubbed foot	9
Hydrocephalus	8
Spina bifida	6
Cleft lip	4
Encephalocele	2
Syndactyly	2
Imperforate anus	2
Anencephaly	1
Lymphangioma	1
Bladder exstrophy	1

This is a common occurrence in rural or remote hospitals in our country. Physical examination of newborn babies was simple and limited to inspection and palpation. Only newborn babies born alive were seen and examined soon after birth; still births were not examined. Because of the lack of sophistication in diagnostic capabilities, we are quite certain that our reported number of malformations is much lower than the true incidence (5). When we studied yearly incidences of these congenital malformations, we observed a progressive increase with time, with four cases half-way through the year 2001 (0.92% of live births), the third year of civil war in the DRC. We suspect that our under-reporting, however, does not influence the trend observed, given that the same personnel conducted the clinical examinations of newborns over the time period covered by our study. However, it is possible that our observations may change should all babies be examined by a doctor and should advanced diagnostic methods be available in the future; with an overall incidence of congenital malformations most likely higher than that reported in our study.

Hardship arising from this war, significant impoverishment, severe socio-economic crisis and ongoing stress may explain the increase in number of observed cases of congenital malformations. Several investigators have shown that women going through stressful events during the conception period or early in gestation were prone either to deliver babies with congenital anomalies or still births (6,7). During DRC's war, the majority of basic health activities including antenatal clinics were discontinued; consequently, women of reproductive age no longer had reliable access to antenatal supplementation with folate, and certainly, their ability to sustain adequate nutrition event without pregnancy was compromised (8). Such lack of adequate nutrition may explain the relative frequency with which neural tube defects and CNS malformations were encountered (47.2% of cases). The predominance of neural tube defects and CNS malformations has also been observed by others in the developing world (9 – 11). Of curious note, our observed frequency of clubbed feet (25% of cases) was very high compared to that observed by others such as Kromberg and Jenkins in South Africa (0.15% of cases).

A civil war can lead to two major types of consequences: direct consequences such as death and traumatic injury, and indirect consequences such as an increase in premature labour and deliveries as shown by Ahuka in the Ituri district, DRC (12). The stress that people go through during periods of civil war and armed conflict, coupled with lack of proper medical care, and the use of the widely available expired drugs, may explain the increase in the number of cases of congenital malformations that we have seen in our study, and given the lack of sincere commitment by all parties to end the conflict soon, we worry that this trend of increasing incidence of congenital malformations may continue in the future.

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