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Clinical Study
Craniofacial Anomalies

Craniofacial anomalies amongst births at two hospitals in Nairobi, Kenya☆

A. Odhiambo, E. C. Rotich, M. L. Chindia, F. G. Macigo, M. Ndavi, F. Were
University of Nairobi, School of Dental Sciences, Nairobi, Kenya

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Abstract. The pattern of congenital oral and craniofacial anomalies (CFAs) in the Kenyan population remains unknown. The objective of this study was to describe the pattern of occurrence of CFAs at two hospitals in Nairobi. A descriptive cross-sectional study at the Kenyatta National Hospital and Pumwani Maternity Hospital was carried out from November 2006 to March 2007. Mothers who delivered at the hospitals consented to an interview and physical examination of their babies within 48 h of delivery. The anomalies were classified for type and magnitude. Data were analysed to determine the association of these anomalies with ages of the mothers, gender, weight, birth order, mode of delivery and birth status of the babies. During the study period, 7989 babies were born. The CFAs manifested in 1.8% of the total births and were more common in female (1.4%) than in male (1.0%) live births. 12.8% of stillbirths had CFAs, with lesions manifesting more in males (16.7%) than in females (6.9%). The commonest CFA was preauricular sinus (4.3/1000) followed by hydrocephalus (1.9/1000) then preauricular tags and cleft lip and palate (1.5/1000 and 1.3/1000 total births, respectively).

Key words: craniofacial anomalies; fresh stillbirths; macerated stillbirths; spontaneous vertex delivery; caesarean section.

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Congenital craniofacial anomalies (CFAs) are rare.[1] Cleft lip and or palate are the most common, occurring in 0.06–2.13/1000 live births.[2] The highest incidence of cleft lip and palate has been reported in the Indian tribe of Montana (1:276), followed by oriental groups (1:500); the least affected are the negroid population (1:2000).[3] Single minor anomalies occur in 14% of newborns[4–6] whilst major congenital malformations are found in 2% of live births and 22% of stillbirths.[6] The maternal age most involved in anomalies is 20–35 years and the pregnancies affected are mostly breech presentations and often the first born. A higher frequency of major anomalies occurs in multiple births than in single births and males have more malformations than females.[7,8]

Major congenital anomalies are amongst the leading causes of neonatal mortality, they contribute substantially to chronic disease morbidity, profoundly affect families and their management is expensive and long term. Minor anomalies may be unwanted, cosmetically disfiguring and may be a sign of internal anomalies; hence the need to know their pattern of occurrence in any population. Classification of CFAs is usually based on new theories but it always remains controversial.[1] Anatomical classification includes oral, nasal, aural, orbital, cranial and other organ/structural anomalies. A review of the published literature (Table 1) reveals a paucity of information on the pattern of occurrence of CFAs in most African populations including those in Kenya. The purpose of the present study was to document the pattern of occurrence

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Table 1. An overview of studies that show incidence of CFAs.

Author and year	Anatomical classification of the anomalies	Specific anomalies
Al-Omari et al. (2004),[9] Cawson (1991),[10] Dilley et al. (1991),[11] Day (1984),[12] Fasana (1980),[13] Jain and Krogan (1983),[14] Gorlin et al. (2000),[15] Hunter and Roberts (1988),[16] Iregbulem (1982),[17] Kalter and Warkany (1983),[18] Khan and Ivanov (1977),[2] Moore and Persand (2003),[5] Murray et al. (1997),[19] O'Doherty (1975),[26] Persaud (1979),[20] Russell et al. (2004),[3] Scheinfeld et al. (2004),[21] Screan and Connor (1996),[22] Stricker et al. (1990),[1] Tomizawa et al. (1999),[23] Wilson and Clarke (1977),[24] Yadav (2001)[25]	Oral anomalies	Clefts,[1,2,3,5,9–14,17,19,25] micrognathia, aglosia, agnathia, leukoedema,[1,25] mucocoeles, cysts,[12,20,22] pits/fistulae,[21] epulides, lymphangioma, notch,[11,23–25] natal/neonatal teeth,[2,6,11,16,23] aglosia, ankyloglosia, macroglosia[5,10,11,15,18,24,25]
Chung and Myrianthopoulos (1975),[7] Moore and Persand (2003),[5] Fasana (1980),[13] Kalter and Warkany (1983),[18] Stricker et al. (1990)[1]	Ocular anomalies	Cyclopia,[13] ethmocephaly, synophthalmia, microphthalmia, anophthalmia, cryptophthalmia microblepharon, microorbitism, euryblepharon, coloboma, blue sclera[1,5,7,18]
Fasana (1980),[13] Gorlin et al. (2001),[15] Kohelet and Arbel (2002)[26]	Nasal anomalies	Nasal aplasia with proboscis, choanal atresia, nasoschisis, nasal duplication[1,13,18]
Durakbasa et al. (2004),[27] Fasana (1980),[13] Moore and Persand (2003),[5] Scheinfeld et al. (2004),[21] Stricker et al. (1990),[1] Wang (2001)[28]	Aural anomalies	Microtia, preauricular sinus,[1,5,27] tags,[5,28] fistulae,[13,21] duplication of external auditory meatus, atresia, auricular hypoplasia[5,21]
Day (1984),[12] Kalter and Warkany (1983),[18] Mcintosh et al. (1954),[4] Scheinfeld et al. (2004)[21]	Cranial anomalies	Acrania, microcephaly,[4,12] macrocephaly,[18] hydrocephalus,[18,21] cranium bifidum[18]
Chung and Myrianthopoulos (1975),[7] Fasana (1980),[13] Moore and Persand (2003),[5] Scheinfeld et al. (2004)[21]	Cutaneous anomalies	Congenital alopecia, random patches of white hair,[13,21] absence of skin[5,12]

Most of these anomalies appear only as case reports in the literature.

of CFAs in two hospitals in Nairobi over a 4.5 month period.

Material and methods

This survey was executed at the two largest government delivery centres in Nairobi, Kenya, after approval by the institutional review boards. The study population included all mothers who delivered and their babies. It was a descriptive cross-sectional study of incidence of clinically manifest CFAs at birth with the dependant variable being the presence of an anomaly. The demographic data documented included age of mother, birth status, mode of birth presentation, gender, birth weight, birth order and mode of delivery of each participating subject. The inclusion criteria entailed all births at 20 weeks or more of gestation and/or at least a 500 g birth weight. Only mothers with Kenyan citizenry were included in the study. Sample size was calculated using the Fisher et al. formula for population studies using the prevalence of single minor anomalies (14%) since these anomalies are the ones which have been widely reported on.

All women admitted for delivery were requested to agree to an interview and examination of their babies within 48 h of admission. An interview and examination form was used to document the demographic data and record findings from systematic examination of all births by midwives who had been trained by the principal investigator (PI) on how to complete the forms and how to perform a head to toe examination of the infants to elicit anomalies. The anomalies were classified by the structures involved, whether they were major or minor and whether single or multiple. Each centre was manned day and night. The PI visited the study sites daily and during each visit randomly picked the completed interview schedules at each centre and re-interviewed the mothers. The babies present were then re-examined. Informed consent was obtained from the mothers and confidentiality was ensured by use of in-patient numbers only.

Whenever a case was delivered, the PI was alerted by mobile phone. Any infant with an anomaly transferred to the newborn unit before examination was examined whilst any stillbirth transferred to the mortuary before examination was followed by the investigator for examination and photography where indicated. Each malformation was counted once, such that if an infant had both cleft lip and encephalocoele, it entered both classes for the tabulation of the number of infants with each anomaly born in the population. Parents with questions on malformations were counselled and educated by the investigators. Referrals for further management were made according to the rules of each hospital. Data analysis was done according to the statistical package for social sciences (SPSS) software version 12.0 and Epi Info packages.

Results

During the study period there were 7989 new births: 4264 (53.4%) male, 3721 (46.6%) female and 4 (0.05%) with ambiguous external genitalia. 146 CFAs occurred in 1.8% of the total births. There were 7623 live births with CFAs in 1.3%. There were 366 (4.6%) stillbirths in the two hospitals, with 12.8% CFAs: 174 males, 188 females. Of these, 29 (16.7%) male and 13 (6.9%) female stillbirths had CFAs. Although there were more female stillbirths, the male babies had more anomalies than the females. The four babies with ambiguous external genitalia were all stillbirths and had major multiple CFAs (Table 2). The youngest mother was a 12-year-old primigravida