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Profile of Childhood Hearing Loss in A Nigerian Teaching Hospital

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Abstract

Background: Childhood hearing loss in the developing world is associated with late diagnosis and rehabilitation challenges.

Methods: A retrospective review of all the cases of childhood hearing loss from January 2007 to December 2011 in a tertiary health institution.

Results: A total of 53 patients, with the majority (92.5%) resulted from acquired causes of which 88.7% were due to birth asphyxia. Over 73% presented with moderately severe to profound hearing loss. Only 15% had a hearing aid fitted, 22.6% will require cochlear implant, while 43.3% could not afford a hearing aid.

Conclusion: Developing countries are noted for a higher prevalence of acquired and preventable causes of childhood hearing loss. Primary prevention through effective obstetric care, public enlightenment, incorporation of universal hearing screening programs into the national policies, and readily available and affordable rehabilitative facilities are advised.

Key words: *Childhood hearing loss, rehabilitation, hearing aid, developing country*

Introduction

Congenital hearing loss is the hearing loss that is present at birth, usually due to hereditary and non-hereditary causes. Studies suggest that there are about six per 1,000 babies born in developing countries with permanent hearing loss. This is more than the estimated 1–4 babies per 1,000 live births in developed countries [1–4]. The World Health Organization (WHO) estimates that globally, the number of people with hearing loss more than doubled from 120 million in 1995 to at least 278 million in 2005 and at present there are about 360 million people with hearing loss, thus making this condition the most prevalent sensory deficit in the population [5–6]. Permanent hearing loss can occur at any age but about 25% of the current burden is of a childhood onset [5]. Annually, up to

798,000 babies worldwide suffer permanent hearing loss at birth or within the neonatal period and at least 90% of them are in developing countries [7].

Over 50% of congenital hearing loss is due to genetic factors. Other conditions present in utero or at the time of birth. Causes of congenital hearing loss include intrauterine infections, prematurity, hypoxia, neonatal jaundice, drugs, and maternal illness during pregnancy. An example of such a maternal illness is Rubella. Rubella is a contagious viral infection associated with congenital sensorineural hearing loss [8] and 10–15% of women are susceptible to this infection in their childbearing years. The disease is usually transmitted to the developing fetus, causing abortion or stillbirth or Congenital Rubella Syndrome (CRS) with its associated Sensorineural Hearing Loss (SNHL) [8].

Congenital and early-onset hearing loss is associated with significant and irreversible deficits in linguistic, cognitive and psychosocial development [5-9]. Consequences of hearing impairment include economic and educational disadvantage, social isolation, and stigmatization [6]. The World Health Organization (WHO) defines 'disabling hearing impairment' in children below the age of 15 years as a permanent hearing threshold level in the better ear of 31 dB loss or more using pure-tone average over octave frequency levels 0.5–4.0 kHz [7] Primary prevention through immunization, genetic counseling, and improved antenatal and perinatal care may help to address some environmental causes, such as birth trauma, infection and neonatal jaundice, but has a limited impact on genetic or hereditary etiologies [10]. Also, many of the adverse linguistic, cognitive, psychosocial and educational consequences of this condition can be avoided or significantly curtailed if the affected children are detected and supported not later than the first year of life, alongside primary preventive efforts to address the risk factors for this condition [9,10]. Moreover, effective primary prevention is rarely possible in children with idiopathic congenital hearing loss, especially in developing nations [1,9,10]. Nonetheless, such infants can develop essential language and cognitive skills if the condition is detected early and they are provided with appropriate intervention services within the first year of life [10].

The World Health Assembly passed a resolution in 1995 urging Member States to: "prepare national plans for the prevention and control of major causes of avoidable hearing loss, and for early detection in babies, toddlers and children within the framework of primary health care" [10,11]. In line with this, and with the aim of achieving the goal of early detection, universal newborn hearing screening using transient evoked otoacoustic emissions (TEOAE) and automated auditory brainstem responses (AABR) before hospital discharge has been effective in many countries [10]. This is not the case in many developing countries of the world and in the absence of such objective screening; congenital hearing loss may not be detected until the child is 2–6 years of age, when intervention outcomes may be suboptimal [10]. In support of this is current evidence that suggests that Nigeria has the highest proportion of developmentally disadvantaged children in the world [1, 9, 10].

It has been suggested that problems of Nigerian children with profound deafness were thought to be late diagnosis [8]. Although deafness is one of the greatest of all disabilities, the hearings impaired are often a neglected group. They suffer from a 'hidden handicap' that is commonly overlooked by health workers, communities and government [9]. Fortunately, deafness among the inhabitants of developing countries is gaining recognition as a potential inhibitor of development.

This study aims to review the profile of all the children with congenital deafness in a tertiary health institution in Nigeria, and also aims to document the various etiological factors, compare the findings with those of already published studies, and proffer a solution for the amelioration of the burden of hearing loss, especially in the developing world.

Materials and Method

Medical records of all the cases of congenital hearing loss from January 2007 to December 2011 at the Ladoke Akintola University of Technology Teaching Hospital, Osogbo, Osun State, Nigeria were retrospectively reviewed. Information retrieved by the investigator from the record included: socio-demographics, pure tone audiogram/(free field audiogram for children aged less than 5 years), details of pregnancy history, antenatal care, investigations (including radiological), delivery, immediate post-delivery baby status and

care, perinatal period, and detailed family history were noted. Pure Tone Audiometry (PTA) was performed for the patients using the Elkon 3N3 multi, by Elkon India, calibrated yearly to the ISO standard in a sound-proof room at 0.5, 1, 2 and 4 kHz. The pure tone average was determined for frequencies 0.5, 1, 2, and 4 kHz. The degree of hearing loss exhibited by the patients was classified according to the World Health Organization classification of hearing loss. Patients whose audiometric data were insufficient or who were lost to follow-up were excluded from the study.

Results

A total of 53 patients with childhood hearing loss were seen during the study period. This represents 53/7,683 (0.7% or 7/1,000) patients seen during the period, with the male:female ratio being 3:2. The ages of the patients ranged from 10 months to 16 years and age group 1 to 5 years constituted the largest proportion (66%). Table 1 shows age and sex distribution of the study population. Forty-nine patients (92.4%) were delivered at private facilities, while only 7.6% were delivered at government facilities. Table 2 shows the various probable causes of hearing loss as seen in the pre-

Table 1. Age and gender distribution of the study population.

Variables	Frequencies	Percentage
Age (in years)		
0-5	35	66
6-10	9	17
11-15	6	11,3
16-18	3	5,7
Total	53	100
Gender		
Male	32	60,4
Female	21	39,6

Table 2. Probable causes of childhoods hearing loss among the patients.

Aetiology	Frequencies	Percentage
Birth asphyxia	47	88,7
Idiopathic	3	5,7
Genetic	1	1,9
Neonatal jaundice	1	1,9
Prematurity	1	1,9
Total	53	100

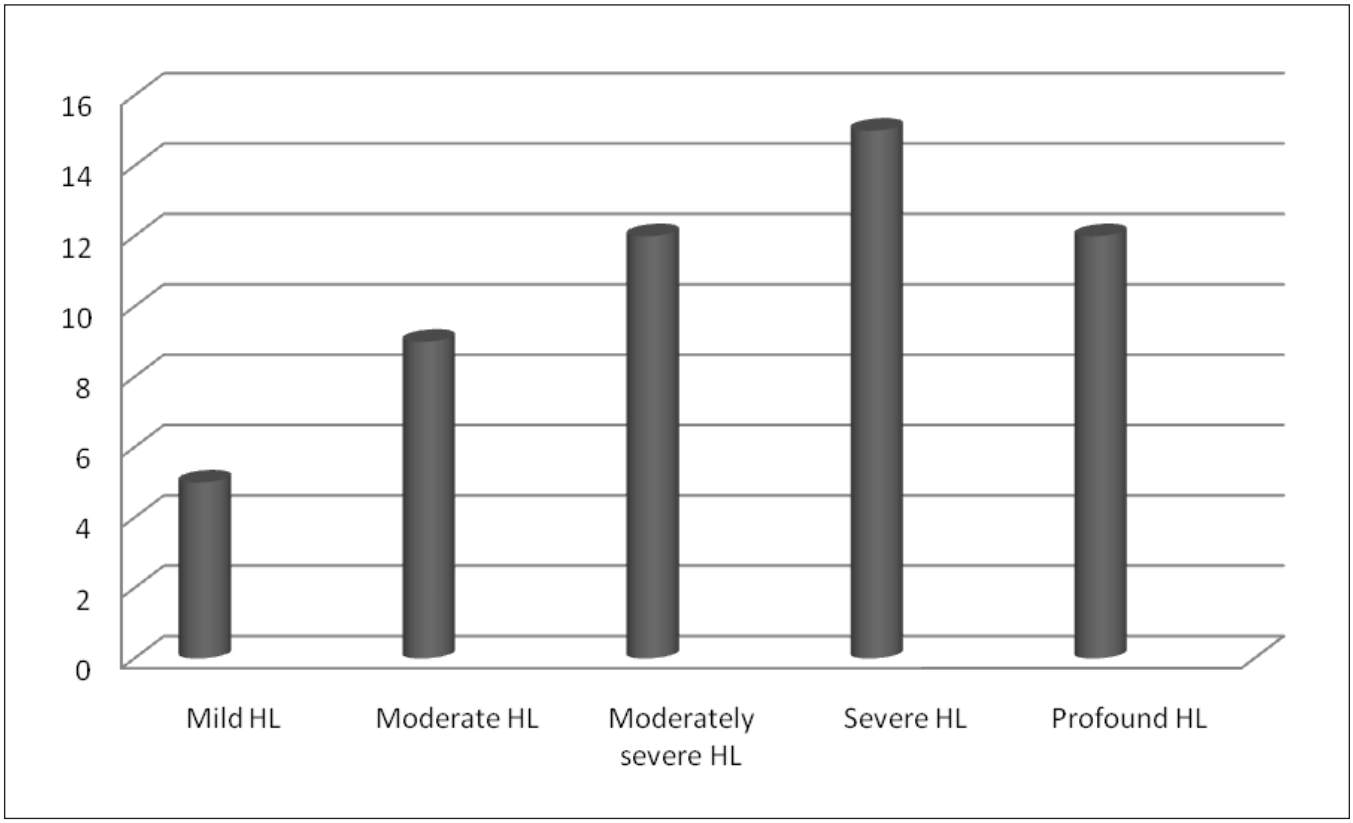

Figure 1. Degrees of hearing loss among the patients.
NB: Mild HL = 26–40 dB, Moderate HL = 41–55 dB, Moderately severe HL = 56–70 dB, Severe HL = 71–90 dB, Profound HL = >90 dB

sent study. The majority (92.5%) were due to acquired causes, of which birth asphyxia was the leading cause of hearing loss, accounting for 88.7%. This was followed by idiopathic hearing loss, which accounted for 5.7%.

Figure 1 shows the various degrees of hearing loss exhibited by the patients (classified according to the World Health Organization classification of hearing loss). The majority of the patients (73.5%) presented with moderately severe to profound hearing loss, while 14 (26.4%) had mild to moderate hearing loss.

The majority of these patients had hearing aid assessments performed on them and showed signs of benefit from aid use. However, only 15% of those that benefitted from a hearing aid procured and had hearing aids fitted, followed by intensive auditory and speech training with subsequently good speech development; 22.6% will require cochlear implant and were referred, while 43.3% could not procure the hearing aid due to financial incapability or due to ignorance.

Discussion

Hearing impairment is the most frequent sensory deficit in human populations and congenital hearing loss is a global problem. Both congenital hearing loss and childhood onset hearing loss were included in the Global Burden of Disease Study [6]. In this study, a prevalence of 0.7% (or 7/1,000) was found among the patients presenting at our teaching hospital. Olusanya et al. [9] reported a prevalence of 5.5/1,000 in a hospital-based universal screening program in Lagos, South Western Nigeria. A similar community-based hearing screening program reported a prevalence rate of 28/1,000 of permanent congenital hearing loss [10]. This shows that hospital-based studies do not give a true estimate of the community prevalence. This may be because a large proportion of the affected population may not report to the hospital until later in life when it is detected at school. Some may never present at the hospital. The greater proportion of those with congenital hearing loss in this study was of the male sex. This finding is similar to findings from previous published studies [11, 12]. The observed male preponderance may be due to the fact that male children are more valued than their female counterparts in the African traditional belief, with a greater tendency for parents to report hearing problems in males compared to females [13]. Another possible explanation is that congenital hearing loss may be sex-linked [14]. Yet another possible explanation is the demographic preponderance of males at birth.

The majority (66%) of the patients was within the age group 1–5 years and there was a progressive decline in frequency with increasing age. Dumade et al. in Ilorin, North Central Nigeria [15] reported similar findings with the highest prevalence of hearing loss (55.2%) among age group 1–6 years. This may be largely due to the reason that awareness of parents of hearing loss in their children and subsequent diagnosis is usually made around this age group because most children are enrolled in school during this period. A similar study reported the highest prevalence of childhood hearing loss among age group 1–3 years [16]. This trend of late presentation and diagnosis of children with hearing loss when intervention strategies would be suboptimal is usually the situation in most developing countries, and there is a need for increased public awareness of the early signs of hearing impairment in children and the need for early and prompt presentation, especially within the first year of life.

The majority (98.1%) of the cases of congenital hearing loss in this present study resulted from acquired causes. This figure is significantly higher than those reported from previous studies [15,16]. Dietz et al. [17] in Finland reported a decline in the proportion of acquired hearing loss compared to the proportions for genetic and unknown causes. This shows that the majority of the cases of childhood hearing loss in developing countries are highly preventable.

Birth asphyxia was responsible for the majority of the acquired causes in the present study. Olusanya et al. [1] in their study "Non-hospital delivery and permanent congenital and early-onset hearing loss in a developing country" reported that the lack of skilled attendants at birth rather than non-hospital delivery by mothers was significantly correlated with permanent congenital hearing loss. This usually resulted from labor complications such as prolonged/obstructed labor, intrapartum stress, pre-eclampsia/eclampsia, and infections during and after labor [1,18,19].

Attention has to be paid to the various other identifiable causes such as measles, meningitis, febrile ill-

ness, mumps, and congenital rubella syndrome. There is a need to improve upon childhood immunization programs to make available vaccines that are viable and potent, and promote wider and effective coverage and inclusion of those vaccines that have not been incorporated into the scheme. Particular attention should be focused on rubella vaccination for all ladies in the reproductive age group. An effective immunization program against meningococcal meningitis in the Gambia has reduced the incidence of congenital hearing loss in the country [17]. Previous similar study [8] in India reported a low percentage of children with rubella-induced hearing impairment and concluded that the low rate may be due to appropriate immunization of mothers to the rubella infection during their child-bearing years.

Other factors, for example, certain practices of some non-government hospitals and Traditional Birth Attendants (TBAs), from initial management of labor complications to delay in referral to health facilities, may have placed some children at risk of congenital hearing loss. Mothers who have received antenatal care in hospitals and are trying to avoid possible caesarean section often seek vaginal delivery in non-hospital-based facilities, even when this mode of delivery presents significant risks to both mother and child [20]. Referral to a hospital occurs late and only where there is a glaring failure of vaginal delivery [1]. According to WHO data, the proportion of births without skilled attendants in Nigeria is 64.8% [21] and a lack of skilled attendants and bad obstetric practices in such settings have been associated with a high prevalence of permanent acquired congenital hearing loss [1]. The majority of the deliveries in our series were at private facilities manned by traditional birth attendants. The need for training and retraining of such personnel should be advocated so that they will know their limitation and appropriate time to refer to prevent the majority of those acquired cases of hearing loss attributable to bad obstetric practices [1,22,23].

The high risk and association between neonatal jaundice (NNJ) and congenital hearing loss have been documented [24,25]. Moreover, the resultant unconjugated hyperbilirubinemia from rapid hemolysis of the red cells has been implicated in the pathogenesis of this condition in Nigeria [26]. The primary prevention of NNJ would necessitate public education on the causes of NNJ, the avoidance of hemolytic agents, particularly at antenatal clinics, and prompt recognition and early presentation of neonates with NNJ. Prompt treatment with phototherapy and exchange blood transfusion is essential for rapid elimination of the dangers from the neurotoxin effects of unconjugated hyperbilirubinemia.

The diagnosis of genetic/familiar hearing loss in our study was based on family history or associated features in the syndromic type, because genetic screening is not readily available in our center. The low proportion of such cases in our study (1.9%) may be related to the fact that many families in South Western Nigeria would usually deny such history due to cultural beliefs and the fear of social stigmatization [1]. Another factor that may be responsible is the rarity of consanguinity (a forbidden practice) in South Western Nigerian cultures.

A high prevalence of moderately severe to severe hearing loss, as found in the present study, has been previously reported [14, 16, 27]. The most important factors in the management are early detection and intervention. Unfortunately, this usually does not occur in developing countries, like Nigeria, where presentation is usually late and profoundly deaf children who may need cochlear implantation may find such intervention programs not readily available [15]. Those with mild to moderate hearing loss will usually benefit from hearing aid fitting, which will help them in language development, improvement in academic performance, and avoidance of social stigmatization.

There is a need for governmental intervention to ameliorate the burdens of the profoundly deaf children through the training of personnel for all phases of their rehabilitation, as well as making cochlear implants and other prosthetics for rehabilitation readily available at highly subsidized rates or even free for these children as the cost of cochlear implantation is usually beyond the reach of most families or parents of profoundly hearing-impaired children.

A very small proportion of the affected children with congenital hearing loss had adequate rehabilitation. Only a few were provided with a hearing aid followed by speech and auditory training. Though there is increasing awareness of hearing aid use in Nigeria, [15] various factors that still militate against its use include

high cost, ignorance and a lack of ready access to the hearing aids.

In addition, the age of presentation of most of the affected children needs to be strongly addressed if children are to benefit optimally from the rehabilitative exercise. It has been said that the first year of life is the best time for presentation and for any meaningful and realistic intervention for optimal speech and language development.

Governments have to play a greater role by incorporating universal hearing screening programs into national policies. This has been adopted by the developed nations of the world. Hospital- and community-based pilot universal hearing screening of newborns had been conducted by Olusanya et al. [1, 2, 9, 10] who concluded that it is feasible in Nigeria. This will be made possible and effective by the training of relevant personnel and incorporating routine childhood screening into the routine childhood programs in developing countries like Nigeria [9, 10]. Also, a frantic effort should be made to make hearing aids more readily available and affordable (and if possible, free) for all the affected children and there should be public enlightenment by both the health workers and the government about the benefits of early presentation and diagnosis of hearing-impaired children.

Conclusion

Congenital hearing loss is a prevalent and global problem. Developing countries are, however, noted for a higher prevalence of acquired and preventable causes. Every effort should be geared toward primary prevention through reorganization of childhood immunization programs, effective obstetric care by ensuring availability of skilled attendants at birth, and public enlightenment programs on early identification and prompt presentation of hearing-impaired children. The outcomes from these primary prevention initiatives will lead to a significant reduction in the burden of congenital hearing loss in Nigeria. Governments should also be encouraged to incorporate universal hearing screening programs into the national policies and make speech and auditory training programs as well as hearing aids and cochlear implants more available and affordable in order to ameliorate the burdens of hearing-impaired children in the developing world.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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