

RESEARCH PAPER

**HEARING LOSS IN POST-MENINGITIS PATIENTS IN
KOMFO ANOKYE TEACHING HOSPITAL**

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ABSTRACT

Meningitis is one of the infective disorders which can complicate with hearing loss. This study evaluates the incidence of hearing loss in patients who had suffered from a bacterial meningitis infection. The aim of this study was to find out the incidence rate of hearing loss in patients after recovering from meningitis. Some patients who were admitted, diagnosed and managed as cases of bacterial meningitis from the medical and the children's wards of the Komfo Anokye Teaching Hospital were recruited to participate in this study after they had been discharged. These patients underwent a hearing assessment using a pure tone audiometer. These patients who survived meningitis were aged between (8-62) years with a mean age of 32.1 years. Of the 58 patients evaluated 12 (20.7%) presented with a sensorineural hearing loss. 6.9% of the patients presented with a mild hearing loss, 8.7% with a moderate hearing loss, 1.7% with a severe hearing loss whereas the remaining 3.4% presented with a profound hearing loss. This study showed that patients who suffered from meningitis infection may develop hearing loss.

Keywords: *Meningitis, Sensorineural hearing loss, Epilepsy, Hydrocephalus, Cognitive defect*

INTRODUCTION

Meningitis is an inflammatory condition of the protective membranes covering the brain and the spinal cord, known collectively as the meninges. The inflammation may be caused by infection with viruses, bacterial or others microorganisms. Meningitis can be life-threatening because of the inflammation's proximity to the brain and the spinal cord; therefore the condition is classified as a medi-

cal emergency.

The microorganisms that can cause meningitis include *Neisseria meningitidis*, *Meningococcus*, *Haemophilus influenzae* type B, *Pneumococci* and *Mumps virus*.

The most common symptoms of meningitis are headache and neck stiffness associated with fever, confusion or altered consciousness, vom-

iting and inability to tolerate light (Photophobia) or loud noises (Phonophobia). Despite its poor prognosis, survivors of meningitis can be left with certain sequelae of a long term consequences such as deafness, epilepsy, hydrocephalus as well as cognitive defects.

There are several potential disabilities which can result from damage to the nervous system. Sensorineural hearing loss, epilepsy, learning and behavioural difficulties, as well as decreased intelligence that may occur in about 15% of survivors (Saez-Llorens and Gracken 2003). Some of the hearing loss may be reversible (Richardson *et al.*, 1997). According to van de Beek *et al.* (2006) the main complications in meningitis were deafness in 14% and cognitive impairment in 10% of their study sample. Bacterial meningitis occurs in about 3 people per 100,000 annually in the Western countries. In Brazil, the rate of bacterial meningitis is higher, at 45.8 per 100,000 annually (Attia *et al.* 1999). Sub-Saharan Africa has been plagued by large epidemics of meningococcal meningitis for over a century (Lapeyssonnie, 2002), leading to it being labeled as the "Meningitis belt". Epidemics typically occur in the dry seasons with an attack rates of (100-800) cases per 100,000 (WHO Report 1998).

Baldwin *et al.* (1985) reported of post-natal sensorineural hearing loss (SNHL) as one of the major complications in meningitis. In their 12 month retrospective study conducted on 54 children discharged from the Children's Hospital, Birmingham (Alabama) with a diagnosis of generalized meningitis, they identified that 38 patients (70%) had Haemophilus influenza meningitis and 40% of these children tested audiometrically were determined to have SNHL. Berlow *et al.* (1980) also assessed the incidence of patients surviving meningitis and realized an incidence rate of 11% without any consistent audiometric pattern.

Zakzouk *et al.* (1992) reported in Riyadh (Saudi Arabia) of a study of 68 meningitis patients with an incidence rate of 26.4% of sen-

sorineural hearing loss, 20.6% of conductive hearing loss and 3.0% of mixed hearing loss. Koomen *et al.* (2003) reported in Amsterdam (Holland) of an incidence of hearing loss of 7% in a study conducted between 1990 and 1995.

Dodge *et al.* (1984) also reported of post meningitis sensorineural hearing loss of 10% in children (ages 2 months to 14 years; mean age of 20 months) who recovered from acute bacterial meningitis. Deafness or some degree of hearing impairment is the most common serious complication of bacteria meningitis in infants and children. Retrospective studies indicate that some 5 to 30 per cent of cases involved such an unfortunate condition with this complication. Fortnum and Davis (1993) in Nottingham reported of an incidence rate of 7.4% hearing loss in patients surviving meningitis.

Grimwood *et al.* (1995) also reported of the bacterial meningitis leading to an eventual psychological and educational adverse outcomes as well as deafness in school age survivors, and this disability can affect their school performance. Dunmade *et al.* (2007) identified meningitis as one of the causes of bilateral hearing loss in Nigerian children with an incidence rate of 8.7% of hearing loss.

Hodgson *et al.* (2001) reported of an incidence of 6.0% of hearing loss in post-meningitis patients in a study conducted in Navrongo (Ghana). Jusot *et al.* (2013) also reported of an incidence of 31.3% of hearing loss in post-meningitis exposed subjects in Niger. Fortnum (1992) reported from a review of literature that the incidence of hearing loss in post-meningitis patients may be as low as 3.5% or as high as 37.2%. This study was conducted to find out the type and the degree of hearing loss that a post-meningitis patient might complicate with.

MATERIALS AND METHODS

This was a prospective study carried out in the Department of Ear, Nose and Throat (ENT) of the Komfo Anokye Teaching Hospital between

January 2008 and December 2012. These were patients who had been admitted, diagnosed and managed as cases of bacterial meningitis. These patients were invited for a hearing assessment after they had been discharged. Upon seeking their consent, their hearing levels were assessed using a non-invasive procedure and 58 of them reported for the hearing test. These patients underwent thorough ear, nose and throat examinations and a pure tone audiometry performed on them using an Audiometry (KAMPLEX AT 27). The examinations were performed within the first month after being discharged from the ward. After an otoscopic examination the patients were sent to the sound proof test room within the Hearing Assessment Center of the Komfo Anokye Teaching Hospital where their hearing assessments were performed. Air conduction and bone conduction thresholds were established through the headphones and the bone vibrator.

Data generated was entered onto an excel spread sheet and exported to STATA 11 statistical software, Stata Corp 4905 Lakeway Drive Special Edition College Station, Texas 77845 USA 800- STATA-PC. The ratio of male to female was determined, the proportion of cases presenting with various degree of sensorineural hearing loss were analyzed using simple test of proportion and chi square.

RESULT

The 58 post-meningitis patients involved in this study comprised of 36 males (62.1%) and 22

females (37.9%) with a male-female ratio of 1.6: 1 as shown in Table 1.

The patients were aged between 8 and 62 years with a mean age of 26. Eight patients or 3.4% were between 1 and 10 years, 13.8% were between 11 and 20 years, 24.2% were between 21 and 30 years, 34.5% were between 31 and 40 years, 20.7% were between 41 and 50 years whereas another 3.4% were between 51 and 60 years as shown in Table 2.

Of the 58 patients evaluated 12 representing 20.7% were found to suffer a sensorineural hearing loss of variable degrees. None of the patients presented with either a conductive or a mixed hearing loss.

Of the 58 patients evaluated for hearing loss, 4 of them (6.9%) presented with a mild hearing loss, 5 of them (8.9%) had a moderate hearing loss, one of them (1.7%) had a severe hearing loss whereas the remaining 2 (3.4%) presented with a profound hearing loss as shown in Table 3.

The hearing loss manifested in all the patients were in both ears and the patterns were not the same in the patients. None of the patients presented with a unilateral hearing loss.

DISCUSSION

The results of this study provide important suggestions to the minimization of the disability that may result from meningitis. Sub-Saharan

Table 1: Gender of the patients

Gender	Number of patients	Percentage %
Male	36	62.1
Female	22	37.9
Total	58	100.0

Male: Female ratio 1.6: 1.0

Table 2: Age range of the patients

Age range (years)	Number of patients	Percentage %
1-10	2	3.4
11-20	8	13.8
21-30	14	24.2
31-40	20	34.5
41-50	12	20.7
51-60	2	3.4

Age range (8-62) years Mean age 32.1 years

Table 3: The degree, intensity, number and percentages of patients with hearing loss

Hearing Loss	Intensity dBHL	Number of patients	Percentage %
Mild	21-40	6	10.3
Moderate	41-70	8	13.8
Severe	71-90	24	41.4
Profound	91-110	20	34.5

Africa has been found to be one of the endemic areas within the meningitis zone and as such people in this area are more likely to suffer the effects of this disease.

Even though Koomen *et al.* (1995) reported of an incidence of 7.0%, Dodge *et al.* (1980) also reported of an incidence 10.0%, Berlow *et al.* (1980) reported of an incidence of 11.0%, Zakzouk *et al.* (1992) also reported of an incidence of 26.4%. Besides, Hodgson *et al.* (2001) reported of an incidence rate of 6.0%, Jusot *et al.* (2013) reported of 31.3%, Dunmade *et al.* (2007) reported of 8.7%, Fortnum and Davis (1993) reported of 7.4% whereas Fortnum (1992) also reported of an incidence rate of (3.5-37.2) %. In this study the incidence rate of hearing loss in meningitis patients was found to be 20.7%. The incidence rate in this study as compared to the other studies showed that all the incidences fall within the range reported by Fortnum (1992).

The higher incidence rate observed in this study could be due to some of the environmental and climatic factors which contribute to the susceptibility to this disease in the subregion as in comparison to the other parts of the world. The prolonged warm, dry and hazy weather in combination with the poor ventilated residential facilities may contribute to the higher occurrence of this disease.

In this study the type of hearing loss that was manifested in all the patients was sensorineural even though Zakzouk *et al.* (1992) reported of some incidence of conductive and mixed hearing loss. The degree of hearing loss varied from mild to profound, with no consistent audiometric pattern. In this study the degree of hearing loss was mild in 4 (6.9%), moderate in 5 (8.7%), severe in one (1.4%) and profound in 2 (3.4%) of the patients studied. With regard to the pattern of the hearing loss there was no consistency while with the degree of hearing loss the majority of the patients presented with mild

and moderate sensorineural hearing loss.

In view of this it would be advisable to evaluate the hearing acuity of all patients who may survive meningitis where possible because there is the possibility that the post meningitis patient can develop hearing loss as a complication of this disease. The early recognition of a hearing impairment is important for the prompt implementation of the use of a hearing aid and speech and language therapy to facilitate optimal hearing and speech development especially in prelingual patients. Prevention of some cases of meningitis by immunization like Haemophilus influenza type b (Hib), Pneumococcal conjugate vaccine (PCV7), Pneumococcal polysaccharide vaccine (PPSV), Meningococcal conjugate vaccine (MCV4) and then Measles-Mumps-Rubella (MMR) vaccine will likely alter the proportion of cases caused by these organisms and affect the utility of the prediction of the incidence of such complication.

It is therefore recommended that a proper environmental sanitation and immunization policy should be developed and enforced by the West African Health Organization (WAHO). Other health organizations within the sub-region should ensure that policies are implemented to reduce the incidence of meningitis within these areas.

Secondly it is important that in view of the increase in sensorineural hearing loss in the post meningitis population, all children with a diagnosis of Haemophilus influenza, Pneumococcal or Meningococcal meningitis should have an audiological workup, preferably prior to discharge from the hospital.

Lastly we may recommend that due to lack of audiologists, hearing assessment set-ups, speech centers and rehabilitative devices like the hearing aids within our part of the world, it will be very important for us to embark on the prevention of bacterial meningitis.

CONCLUSION

Hearing loss is one of the complications that may be manifested in patients with meningitis and this study has actually shown that with an incidence rate of 20.7%, some measures need to be considered so as to reduce the incidence of this disease. Sub-Saharan Africa geographically lies within the so called "Meningitis belt" zone which is more vulnerable to the meningitis epidemic. In view of this, there is the need for the implementation of an appropriate health education, proper environmental sanitation and an enforcement of vaccination within the sub-region.

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