

# Otogenic Tetanus Among Children In Ibadan, Nigeria

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## Citation

A Akinbohun, G Ijaduola. *Otogenic Tetanus Among Children In Ibadan, Nigeria*. The Internet Journal of Otorhinolaryngology. 2008 Volume 10 Number 2.

## Abstract

Background Tetanus is an acute disease of the nervous system caused by exotoxins of *Clostridium tetani*. Tetanus occurs when a wound is contaminated by the bacterial spores of the bacteria. A discharging ear could be contaminated by the spores. The paucity of publications especially in tropical Africa stimulated this work. Aim To evaluate otogenic tetanus among paediatric age group at University College Hospital, Ibadan, Nigeria. Method A 5 year retrospective study of patients with otogenic tetanus was carried out using the departmental registers and case files. Results Twenty five patients with otogenic tetanus were seen. There were 22 males (88%) and 3 females (12%) with M: F of 7:1 and an average age of 5.5yrs. The duration of illness prior to presentation ranged from 1 – 4 days while the period of hospitalisation ranged from 11 – 32days. The clinical presentations were otorrhoea (100%), trismus (100%) and intermittent spasm (90%). Right ear discharge was found in 60%, left ear discharge in 20% while bilateral ear discharge constituted 20%. Eight four (84%) received partial immunization while 16% never had immunization. Treatment was a combination of adequate aural toileting, use of antibiotics, sedatives, tetanus toxoid and antitetanus serum. Mortality rate was 4% Conclusion Otitis media predisposes to otogenic tetanus especially among paediatric age group. Hence, a thorough ear examination should be done in a child with tetanus without obvious wound.

## INTRODUCTION

Tetanus is caused by the exotoxin produced by *Clostridium tetani* which is a Gram positive anaerobic bacillus with terminal spores. The organism's natural habitat is the soil or any available plant products<sup>1,367</sup>. The exotoxin (neurotoxin) produced in the inoculation site inhibits the cholinesterase at the motor end-plates, resulting in an excess of acetylcholine locally causing a sustained state of tonic muscle spasm<sup>57910</sup>. The neurotoxin also travels along the nerves to the CNS and causes extreme motor neuron hyperexcitability with eventual widespread reflex spasms in response to sensory stimuli. Once the neurotoxin is fixed in the nerve tissue, antitoxin has no neutralizing effect<sup>34</sup>. Tetanus is a common sequela among children in developing countries of the world. The portals of entry of the exotoxin into the body are usually contaminated wounds. When a suppurating ear is the only known portal of entry, it is termed otogenic tetanus.

This study is designed to evaluate otogenic tetanus among children as seen in University College Hospital, Ibadan, Nigeria.

## MATERIAL AND METHOD

All patients in this study were co-managed by otorhinolaryngologists and paediatricians of the University

College Hospital, Ibadan, Nigeria over a 5 year period from 2001-2005. Data obtained from the case notes of each patient included biodata, duration of otorrhea, otologic findings, duration of illness, (presentation, and while recuperating), treatment modality and outcome.

## RESULT

Twenty five (25) patients were seen and managed between January 2001 and December 2005. There were 22 (88%) males and 3(12%) females with male:female ratio of 7:1. The age ranges from 2 years to 15 years with a mean age 5.5years. Otogenic tetanus was more common in children between the ages of 4-8years as shown on in table 2. Duration of otorrhea ranged from 2 days to 6 years with a mean of 1.5 years. Right ear discharge was found in 60%, Left ear discharge in 20% and bilateral ear discharge constituted 20% as shown in table 1. The average incubation period could not be ascertained because of chronicity of most otorrheas. However the onset period of illness ranged between 2- 5 days

**Figure 1**

Table 1: Otogenic Tetanus Sites

Sites	Numer of patients
Bilateral	5 (20%)
Left Ear	5 (20%)
Right Ear	15 ( 60%)
Total	25 (100%)

**Figure 2**

Table 2: Age Distribution

Age Range (years)	Number of patients
1-3	2 (8%)
4-6	12 (60%)
7-9	7 (28%)
10-12	2 (8%)
13 – 15	2 ( 8%)

The duration of illness prior to presentation ranged from 1 day – 4days while the period of hospital stay ranged from 11 days-32days. Those with longer onset period (4- 5days) responded to treatment earlier than those with shorter onset period (2-3days).

Otogenic tetanus constituted 40.32% (25) of the children with tetanus (62) during the period under review. The main clinical presentations were otorrhoea (100%), ear trauma (10%), trismus(100% ), neck rigidity(20%), intermittent spasms ( 90%), fever (10%).

**DISCUSSION**

Otogenic tetanus is a generalised intermittent neurological disorder with spasticity, muscle spasms and autonomic disturbance caused by the neurotoxin-tetanospasmin elaborated by Clostridium tetani from an otogenic source. Strictly speaking,the disease is preventable by immunization <sup>1257</sup>

Clostridium tetani, the causative organism is a motile, Gram positive, anaerobic, non encapsulated rod. Sporulated form gives a characteristic drum-stick appearance microscopically. These spores can survive in dry soil for years. They can exhibit resistance to chemical disinfection and several minutes of boiling water <sup>3456</sup>. It can be killed in an autoclave after 15 minutes <sup>7</sup>. On the other hand,

vegetative form can be inactivated by heat, disinfectants and a number of antibiotics

Tetanospasmin is produced by the vegetative form of Clostridium tetani when the bacillus infects any localized wound site in an unimmunized or inadequately immunized individual <sup>789</sup>.

Tetanospasmin enters the nervous system at the myoneural junctions of alpha-motor neurons <sup>139</sup>. Once the toxin has translocated into the neuron, it is no longer accessible for neutralization. The toxin binds to presynaptic inhibitory synapses in the neuroaxis and prevents transmitter release. The absence of this inhibition allows motor neurons to increase muscle tone and produce rigidity, permitting the simultaneous spasms of both agonist and antagonist muscles <sup>567</sup>.

Incubation period of tetanus which is the time between an injury and occurrence of first symptoms varies from 2 days –months. It is difficult to determine in this study due to chronicity of most otorrhoeas <sup>2</sup>. Onset period which is the interval between initial symptoms and occurrence of reflex spasms is indicative of the eventual outcome. Those with longer onset period (4-5 days) responded to treatment earlier than those with shorter onset period (2-3 days). The former group presented with a milder form of tetanus compared with the latter group. This finding is in keeping with earlier submissions <sup>257</sup>

Otogenic tetanus is a disease that is preventable by immunization. In this study, 21 (84%) received partial immunization while 4(16%) never had antitetanus immunization. Reasons advanced included living in settlements far removed from the nearest health centre; poor road network from settlement to the nearest health centre; non or poor coverage of some remote settlements during national immunization exercise and ignorance of the disease on the part of the parents.

Otogenic tetanus was more common in less than 6 years age group. In this study 19 (76%) were between 4-9 years. A male preponderance in this study is in consonance with other previous reports <sup>127</sup>

Twenty one (84%) of patients with otitis media had copious otorrhoea at presentation and were later found to have perforated tympanic membranes while 3(12%) presented with otitis externa and scanty ear discharge. Their tympanic membranes were intact but dull.

Treatment of otogenic tetanus is entirely conservative in the acute phase of the disease. It involves both the otorhinolaryngologic and paediatric teams. Regular ear toileting and initial ear dressing with flavine in spirit pending the outcome of microscopy, culture and sensitivity results were handled by the otology team. The paediatric team made use of tetanus toxoid, Antitetanus serum (after a test dose), systemic antibiotics, tranquilizers, sedatives and vitamin supplement. Duration of hospital stay ranged from 11-32 days. Bilateral cases, 4(16%) had longer hospital stay.

Mortality rate was 1(4%). This was recorded in a 3- year old male child with bilateral chronic suppurative otitis media, septicaemia, unimmunized and malnourished.

### CONCLUSION

Otogenic tetanus has been found in this study to affect more males than females especially between 4-9 years of age. The children affected in this study were from parents of low socioeconomic status and as such were either poorly immunized or unimmunized!

Emphasis should be placed on adequate immunization of all children especially those with ear infections irrespective of where they live. Tympanoplasty with or without mastoid exploration in selected cases may have a place in preventing recurrence of ear suppuration that constitute a major risk factor in otogenic tetanus

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