

<http://www.ncbi.nlm.nih.gov/pubmed/12290448>

PIP: More than 200 million people worldwide contract malaria from mosquito bites. In sub-Saharan Africa, 100 million clinical cases of malaria are reported every year, resulting in almost one million deaths. ***Malaria has been implicated in the causation of deafness in several studies in the West Africa sub-region.***

This paper examines the association between malaria and deafness, and considers which factors may be involved in the causation of deafness. Although age, immunity, the type of malaria parasite, fever, complications of malaria, and complications resulting from the drug treatment of malaria may contribute to the development of deafness in malaria, the actual mechanism of causation is not clearly understood.

Deafness in malaria is associated with P. falciparum parasitic infection. The author is certain that the high fever in malaria, leading to febrile convulsions and cerebral involvement, can result in deafness. Further investigation is needed to determine whether the presence of untreated malaria parasites in the blood causes deafness.

<http://en.allexperts.com/q/Deafness-Hearing-Impairment-3221/Hearing-Loss.htm>

The most popular treatment for malaria especially in those days was quinine. Quinine is a known Ototoxic drug. ***Although it helps treat Malaria, at the same time it damages the delicate outer hair cells of the cochlea (inner ear). These hair cells are the mechanisms which produce the nerve impulses which then travel to the brain, and are perceived as sound.***

http://www.rnid.org.uk/information_resources/factsheets/healthcare/factsheets_leaflets/drugs_and_hearing_loss.htm

This factsheet is part of RNID's healthcare range. It is written for people who would like to find out more about ototoxic drugs. ***These are drugs that can occasionally cause hearing loss.***

Read this factsheet to find out:

- What are ototoxic drugs?
- How might ototoxic drugs cause hearing loss, balance problems and tinnitus?
- Should I change my medication?
- What is being done to make ototoxic drugs safer?
- What are antimalarial drugs?
- What is aspirin?
- What are antibiotics?
- What are cytotoxic drugs?
- What are diuretic drugs?
- Where can I get more information?

We will give information about the following drugs:

- antimalarial drugs - drugs to stop you from getting malaria, or to treat you if you already have it
- aspirin - a pain-relieving drug
- antibiotics - drugs that treat bacterial infections. The group of antibiotics, which can cause hearing loss, are called aminoglycosides
- cytotoxic drugs - drugs that kill cells and are often used in cancer treatment
- diuretics - drugs that are prescribed if you have too much fluid in your tissues - for example, if you have kidney or heart failure.

What are ototoxic drugs?

Ototoxic drugs may cause damage to the inner ear, resulting in hearing loss, balance problems and tinnitus.

MANIFESTATIONS OF QUININE OTOTOXICITY

Quinine ototoxicity, or cinchonism, presents as **hearing loss, tinnitus**, vertigo, headache, nausea, and visual **loss**.

Hearing Loss

Transient **hearing loss** appears to be the first manifestation of quinine ototoxicity. It occurs a few hours after initiating high-dose therapy (up to 2 g in the treatment of **malaria**).

After prolonged daily dose courses of 200 to 300 mg, up to 20% of patients might have some degree of **hearing loss**.^{1,15} The **hearing loss** is typically reversible and a bilateral symmetric SNHL that affects the higher frequencies initially (at 4, 6, and 8 kHz) with a characteristic 4 kHz notch. Discrimination scores have been noted to drop below 30%.^{1,75}

Although the **hearing loss** after quinine administration is typically reversible, permanent **hearing loss** has been reported, affecting the conversational frequencies.¹¹⁵ In addition, to prevent irreversible **hearing loss**, ultrahigh-frequency audiometry (10 to 20 kHz) has been advocated for accurate monitoring of impending ototoxicity.⁹⁷

Tange and colleagues administered high doses of quinine-dihydrochloride intravenously to 12 healthy volunteers and 10 patients with falciparum **malaria**. In healthy subjects, **hearing loss** was documented at 2 to 4 hours after quinine infusion at a mean maximal plasma quinine concentration of only 2 mg/L. Both high-frequency audiometry (HFA) at 10, 12, 14, and 16 kHz and conventional audiometry (CA) were performed. A unilateral **hearing loss** was initially noted in five healthy volunteers during infusion itself (four in 16 kHz and conventional audiometry (CA) were performed. A unilateral **hearing loss** was initially noted in five healthy volunteers during infusion itself (four in HFA and one in CA). Maximal **hearing loss** was measured 2 to 4 hours after infusion unilaterally in nine subjects (seven in HFA and two in CA). **Hearing loss** did not exceed 25 dB, except in one ear, which showed 35 dB **loss** at 10 and 13 kHz with a persistent **loss** of 20 dB at 14 kHz after 14 months. All others recovered completely within 1 week.⁹² This study underscores the importance of HFA in the early detection of quinine ototoxicity. All patients with **malaria** experienced ototoxicity initially; 9 had **hearing loss**, 10 had **tinnitus**, 8 had aural pressure, and 4 felt giddy. The **hearing loss**

was maximal on the third day of infusion. Final audiograms were normal, indicating reversibility in hearing loss.⁹² Similar findings were noted by Claessen and colleagues in 1998.⁹⁴

In cases of quinine self-poisoning, clinical hearing loss is common only at plasma concentrations over 10 mg/L.⁹⁴ Hearing loss secondary to quinine ototoxicity in patients with plasma levels above 10 mg/L has been found to be largely, if not completely, reversible.^{94,96,97}

Clinical auditory toxicity from quinine has been reported sparingly in malaria patients, despite quinine concentrations almost invariably exceeding 10 mg/L. This is probably explained by the differences in protein binding, the free fraction of quinine being reduced by 25% in patients with uncomplicated malaria and up to 40% for severe malaria.^{94,100} Healthy volunteers were noted to have only one-third of the concentration of α_1 -acid glycoprotein (the main plasma binding protein for quinine) found in malaria patients.⁹²

<http://press.hear-it.org/page.dsp?page=5654>

Needlessly high prevalence of hearing loss in children of Sudan

Hereditary factors, damaging medication, and infections are causing hearing loss among the children of Sudan, according to a study. Researchers believe prevention would lower the prevalence.

Two Sudanese researchers examined 264 children, aged between 14 months and 14 years, all of them suffering from severe hearing loss. The findings were upsetting in that most of the cases of hearing loss could have been avoided through simple preventive measures.

Genetics and quinine most common causes of hearing loss

The most common cause of hearing loss was found to be hereditary factors. As many as 75 percent of the children with hearing loss were born to parents who were close blood-relatives, making hereditary factors the most likely cause of the children's hearing loss.

Quinine, a commonly prescribed malaria medication, is the second most common cause of hearing loss in the children. One in three of the examined children was exposed to quinine during their mother's pregnancy. Another one in four was treated with quinine after they were born. Permanent damage in the inner ear is a known, if not widespread, side effect associated with quinine.
