World Health Organization

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Yaws

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Key facts

- **Yaws is a chronic disfiguring and debilitating childhood infectious disease.**
- **The disease affects skin, bone and cartilage. Humans are currently believed to be the only reservoir. Transmission is from person to person.**
- **Yaws is cured with a single oral dose of an inexpensive antibiotic called azithromycin.**
- **There are 15 countries currently known to be endemic for yaws.**

Overview

Yaws forms part of a group of chronic bacterial infections commonly known as the endemic treponematoses. These diseases are caused by spiral bacteria of the genus *Treponema*, which also includes endemic syphilis (bejel) and pinta. Yaws is the most common of these 3 infections.

The organism that causes yaws, *Treponema pallidum* subspecies *pertenue*, is closely related genetically to *T. pallidum* subspecies *pallidum*, which causes syphilis, bejel and pinta.

The disease is found primarily in poor communities in warm, humid and tropical forest areas of Africa, Asia, Latin America and the Pacific. Most affected populations live in rural areas far from health services. Poverty, low socio-economic conditions and poor personal hygiene facilitate the spread of yaws.

Scope of the problem

About 75–80% of people affected by yaws are children under 15 years of age. Peak incidence occurs in children aged 6–10 years, and males and females are equally affected. Transmission is through person-to-person contact of minor injuries. The initial lesion of yaws is teemed with the bacteria. Most lesions occur on the limbs. The incubation period is 9–90 days, with an average of 21 days. Without treatment, infection can lead to chronic disfigurement and disability.

WHO classifies countries into three epidemiological groups.

Group A: countries with currently known endemic status

Group B: previously endemic countries, with unknown current status

Group C: are countries with no history of yaws.

In 2013, 13 countries were known to be endemic with yaws. Since then, and through intense surveillance activities, 2 additional countries reported confirmed cases (Liberia and Philippines) *(1)* and 3 countries reported suspected yaws cases (Colombia, Ecuador and Haiti).

In 2021, a single case of yaws was reported in a 5-year-old child from Malaysia, one of the countries listed by WHO as previously endemic but current status unknown (*2*). Further investigations are warranted.

Out of the countries and territories known to have been endemic in the 1950s, at least 76 fall into group B and need to be assessed to determine if the disease is still present. This can be done through integrated surveillance with other diseases, especially skin-related neglected tropical diseases.

In 2020, 87 877 suspected yaws cases were reported to WHO from 11 countries, but only 346 cases were confirmed in 7 countries, with the majority of cases coming from the Western Pacific Region (Papua New Guinea, Solomon Islands and Vanuatu). In 2021, 123 866 cases were reported from 13 countries and 1102 cases confirmed from 9 countries. Over 80% of the cases were reported from the West Pacific Region, particularly Papua New Guinea, but most of the cases from this region are not laboratory confirmed.

Signs and symptoms

Yaws initially presents as a papilloma (a wart-like tumour) teemed with bacteria, which makes clinical diagnosis straightforward. Without treatment, the papilloma will ulcerate. The diagnosis of the ulcerative form is more challenging and requires serological confirmation. Papilloma and ulcers are very infectious and in the absence of treatment can quickly spread to others. Other clinical forms of yaws exist but they are not as infectious.

Secondary yaws occurs weeks to months after the primary infection and typically presents with multiple raised yellow lesions or pain and swelling of long bones and fingers (dactylitis).

Diagnosis

Traditionally, laboratory-based serological tests such as *Treponema pallidum* particle agglutination (TPPA) and rapid plasma reagin (RPR) are widely used to diagnose treponemal infections (for example, syphilis and yaws). These tests cannot distinguish yaws from syphilis, however, and the interpretation of results from these tests in adults who live in yaws endemic areas therefore needs careful clinical assessment. About 40% of ulcers clinically misidentified as yaws are caused by the unrelated *H. ducreyi* bacterium.

Treponemal rapid tests are widely available and cheap; however, they cannot distinguish between past and current infection and therefore have limited use in monitoring interruption of transmission. Dual Path Platform Syphilis Screen and Confirm assay (Chembio Diagnostics, USA) can detect both past and present infection. Because of the high cost of the DPP test, initial screening of suspected yaws cases can be done by the treponemal tests and positives confirmed by the DPP. However, countries may choose to use only DPP if affordability is not a problem.

Polymerase chain reaction (PCR) technology is used to definitively confirm yaws by detecting the DNA in the skin lesions. It can also be used to monitor azithromycin resistance. This will be useful after mass treatment and post-elimination surveillance.

Treatment and care

Either of 2 antibiotics – azithromycin or benzathine penicillin – may be used to treat yaws:

- **Azithromycin (single oral dose) at 30 mg/kg (maximum 2 g) is the preferred treatment.**
- **Benzathine penicillin (single intramuscular dose) at 0.6 million units (children aged under 10 years) and 1.2 million units (people aged over 10 years) can be used for**

patients with suspected clinical treatment failure after azithromycin, or patients who cannot be treated with azithromycin.

Patients should be reexamined 4 weeks after antibiotic treatment. Complete clinical healing will be observed in over 95% of cases. Any individual with presumed treatment failure requires macrolide resistance testing and treatment with benzathine penicillin.

Prevention and control

There is no vaccine for yaws. Health education and improvement in personal hygiene are essential components to reduce transmission. Contacts of patients with yaws should receive empiric treatment.

The eradication approach consists of mass treatment (also called total community treatment, TCT) in which oral azithromycin (30 mg/kg, maximum 2 g) is administered to the entire population (minimum 90% coverage) in areas known to harbour yaws.

Three criteria for eradication of yaws are:

- **absence of new serologically confirmed indigenous cases for 3 consecutive years;**
- **absence of any case proven by PCR; and**
- **absence of evidence of transmission for 3 continuous years measured with sero-surveys among children aged 1–5 years.**

Progress

In 2020, as part of the agreement between WHO and the pharmaceutical company EMS Group (Brazil), 1.4 million tablets of azithromycin were sent to Cameroon for large-scale treatment (mass drug administration, or MDA).

From 2021–2023, EMS will provide 9 million tablets to support MDA in several countries, including Cameroon, Central African Republic, Congo, Papua New Guinea, Solomon Islands and Vanuatu. Other endemic countries will receive azithromycin for active surveillance.

A recent study from Papua New Guinea *(3)* has confirmed that administering 3 rounds of mass drug administration with azithromycin at 6-month intervals significantly reduces the prevalence of active and latent yaws compared with one round. These findings offer hope that combined with active surveillance to detect and treat cases in between rounds of mass treatment can lead to early interruption of transmission.

Emergence of azithromycin-resistant strains is very rare but represents a potential threat. Close clinical monitoring of cases and biological surveillance is needed. Linezolid, a low-cost oxazolidinone, has in vitro and in vivo activity against *T. pallidum,* clinical research to assess

the efficacy of linezolid as an alternative to treat macrolide-resistant yaws is being conducted.

The European and Developing Countries Clinical Trials Partnership (EDCTP) is supporting the evaluation of a new loop-mediated isothermal amplification (LAMP) in Cameroon, Côte d'Ivoire and Ghana to detect treponema and azithromycin resistance. The outcome of this study will support the scaling up of the yaws eradication effort.

WHO response

WHO's work on yaws eradication involves:

- **strategy development to guide countries in planning and implementing yaws eradication activities;**
- **development of training material to help health workers and community volunteers identify the disease;**
- **supporting countries via WHO-secured donation of 153 million tablets of azithromycin;**
- **standardized tools to guide data collection and reporting;**
- **strengthening collaboration and coordination among partners and stakeholders; and**
- **advocacy and partnerships.**

WHO recommends integrating yaws eradication activities with NTD programmes (for MDA) and Skin NTDs (active surveillance). In this regard, WHO published a framework on integrated control of skin NTDs in June 2022 to guide countries.

References:

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2. Yaws: The forgotten tropical skin disease.
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3. Trial of Three Rounds of Mass Azithromycin Administration for Yaws Eradication.
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