Recall of symptoms and treatment of syphilis and yaws by healthy blood donors screening positive for syphilis in Kumasi, Ghana

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Abstract

Objective: To describe the recalled medical history, clinical manifestations and treatment of yaws and syphilis by syphilis sero-reactive blood donors in Kumasi, Ghana

Methods: Of the 526 sero-reactive blood donors tested with syphilis rapid diagnostic test (RDT) and later with rapid plasma reagin (RPR) from Komfo Anokye Teaching Hospital, Kumasi, Ghana, 471(89.5%) of them who were confirmed with Ortho-Vitros® Syphilis TP test as the gold standard were interviewed to determine past or present clinical manifestations of yaws and syphilis.

Results: Of the 471 respondents, 28 (5.9%) donors gave a history of skin lesions and sores and of these, four (14.3%) who were all males and RPR positive, recalled a diagnosis of syphilis. All four reported having had skin lesions/bumps with slow healing sores but only one of them had these symptoms before the age of 15.

Conclusions: A small proportion of confirmed sero-reactive donors in our sample had any recall of symptoms or treatment for yaws or syphilis. Our data suggest that clinical questioning adds little further information to the current screening algorithm. The relative contribution of yaws and syphilis to frequent positive tests in endemic areas remains speculative.
Background

Yaws is a neglected non-venereal endemic treponematosis caused by the bacterium *Treponema pallidum* subspecies *pertenue* \(^1\). It is spread by direct skin-to-skin contact predominantly affecting children less than 15 years of age living in poor socioeconomic conditions in certain rural, wet, tropical areas \(^2\). In Ghana, a total of 28,000 cases were reported in 2008 and 25,000 in 2010. In 2012, WHO launched a new initiative to eradicate yaws globally by 2020 \(^3\) using the Morges strategy. The clinical manifestations of yaws include multiple papillomas, non-tender ulcers, sores, plantar hyperkeratosis and pigmentation of the palms and soles, followed by gummata in the last stage \(^1\).

Syphilis is a sexually transmitted disease caused by *Treponema pallidum* subspecies *pallidum*. It can also be transmitted via blood transfusion although the actual risk is low \(^4\). Syphilis starts with primary lesion (chancre - usually on the genitals) followed by a polymorphic rash and lymphadenopathy. This is followed by the occurrence of generalized condition with parenchymal, systemic, and mucocutaneous manifestations \(^5\). The end result may include dementia, gummata, blindness, paralysis, or death.

Usually yaws and syphilis can only be distinguished by epidemiological characteristics and clinical manifestations as the commonly used antibody tests cannot discriminate one disease from the other \(^6\).

This paper reports on recalled history of clinical manifestations of yaws and syphilis by syphilis sero-reactive blood donors in Kumasi, Ghana.

Methods

Of the total of 16,016 blood donors, tested with a treponemal Fortress rapid test (Fortress Diagnostics Limited, Antrim – UK) to *T. pallidum* in serum or plasma antibodies (IgG and IgM), 526 (3.3%) were sero-reactive to syphilis. These were further tested with rapid plasma reagin (RPR, BD Macro-Vue\(^{TM}\) Card test – New Jersey, USA) to detect potential active infections. Out of these, 478 were confirmed with Ortho-Vitros® Syphilis TP test as the gold standard. Of these, 471 confirmed syphilis sero-reactive blood donors (a response rate of 98.5%) were interviewed to determine past or present clinical manifestations of yaws and syphilis (figure 1). Subjects were interviewed by a laboratory scientist with semi-structured questionnaire in local dialect for the presence or absence of current or previous sores or skin ulcers, skin lesions/bumps on the face,
hands, feet, and genitals. They were additionally asked about slow healing sores and at what age they experienced symptoms. They were also asked about any treatment given at the time of these symptoms.

Data were recorded on an Excel spreadsheet and exported into STATA (STATACORP, Texas, version 12.0) for analysis. We obtained approval for this study from the ethics committees of Kwame Nkrumah University of Science and Technology (KNUST) Kumasi, Ghana, and Liverpool School of Tropical Medicine, UK.

Results
The age of confirmed syphilis sero-reactive ranged from 17 to 53 years with a mean age of 31 years (SD=8.6). There were fewer females (29/471; 6.2%) than males (442/471; 93.8%). Of the 471 respondents, 28 (5.9%) donors gave a history of skin lesions and sores (Figure 1). Four (14.3%) individuals out of the 28 donors with history of skin lesions and sores - all males and RPR positive – recalled a diagnosis of syphilis. These four donors had previously received penicillin treatment during their exposure to syphilis. Additionally, the four donors with a recall of syphilis diagnosis reported appearance of lesions/bumps on skin and slow healing sores but only one of them had these symptoms before the age of 15. This cannot even be clarified whether this donor had yaws or syphilis at this young age although treated.

Discussion
The data presented here suggest that a clinical history of yaws is not frequent among syphilis positive blood donors. However, syphilis symptoms were also not reported frequently. Children aged below 15 years are the most vulnerable to yaws infection\(^7\). Only a small proportion of confirmed sero-reactive donors had any recall of symptoms or treatment of yaws or syphilis. Thus the relative contribution of yaws and syphilis to frequent positive tests in endemic areas remains speculative. We have previously suggested combined specific and nonspecific syphilis testing to identify potential infectious donors\(^8\). The present data suggest that clinical questioning adds little further information to this screening algorithm. As a limitation, donors were interviewed after knowing that they had a positive test for syphilis. This is a risk of recall bias.
with reporting being influenced by the test results. There is furthermore a risk of misclassification bias as many differential diagnoses exist for both syphilis and yaws. However, despite these limitations the conclusion that clinical questioning adds little further information when investigating syphilis sero-positive blood donors in areas where both treponematoses exist seems solid.

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Statement of Conflict of Interest

None of the authors declare any conflict of interest regarding this manuscript.

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Figure 1. A flowchart of syphilis sero-reactive blood donors interviewed for clinical manifestations of yaws

526 syphilis sero-reactive blood donors tested with RDT

48 not confirmed

478 confirmed with Ortho Vitros®

471 Interviewed (98.5%)

28 had history of skin lesions and sores

24 had no recall of syphilis exposure

Four had a recall of syphilis exposure

One donor had slow healing sores below 15 years of age

Three donors had slow healing sores after 15 years of age

443 had no history of skin lesions and sores
Highlights

- A total of 478 syphilis sero-reactive blood donors from Komfo Anokye Teaching Hospital, Kumasi, Ghana were confirmed with Ortho-Vitros® Syphilis TP test as gold standard.

- We interviewed 471 consented (a response rate of 98.3%) syphilis sero-reactive blood donors, to determine past or present clinical manifestations of yaws and syphilis.

- A total of 28 (5.9%) donors gave a history of skin lesions and sores.

- Four of the 28 donors (14.3%) who were all males and RPR positive, recalled a diagnosis of syphilis with reported lesions/bumps on the skin and slow healing sores, but only one of them had these before the age of 15.

- Our data suggest that a clinical history of yaws is not frequent among syphilis positive blood donors. However, syphilis symptoms were also not reported frequently.