Advanced Techniques in Biology and Medicine

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Commentary

Diagnostic Techniques in Identification of Typhoid Fever

Hamida Jdir*

Department of Biology, University of Carthage, Tunis, Tunisisa

DESCRIPTION

Typhoid fever is an illness brought on by bacteria of the *Salmonella serotype Typhi*. Mild to severe symptoms can appear anywhere between six and thirty days following exposure. A high fever frequently develops gradually over several days. Weakness, stomach pain, constipation, headaches, and moderate vomiting are commonly associated with this. Some persons experience a skin rash with pink patches.

If left untreated, symptoms could linger for weeks or even months. Although it is not common, diarrhea can be severe. Even if they are unaffected, those who have the pathogen can still transmit the illness to others. Along with paratyphoid fever, typhoid fever is a kind of enteric fever. It is thought that *S. enterica Typhi* only infects and replicates in humans.

The bacterium *Salmonella enterica* subsp. *enterica serovar* is what causes typhoid and it spreads throughout the body, including to the spleen, liver, gallbladder, bone marrow, peyers patches, mesenteric lymph nodes, and intestines by consuming or drinking food or water that has been tainted with an infected person's excrement. Poor sanitation and restricted access to safe drinking water are risk factors. The people who consume contaminated food or drinking water before being exposed to the infection are more susceptible to acquiring symptoms. There are no animal reservoirs for this disease; only humans can contract it.

Diagnosis

The Widal test plus any stool, bone marrow, or blood cultures are used to make the diagnosis (demonstration of antibodies against *Salmonella* antigens O-somatic and H-flagellar). In epidemics and less developed nations, a therapeutic trial period with chloramphenicol is typically started after ruling out malaria, dysentery, or pneumonia while awaiting the results of the Widal test and blood and stool cultures.

Widal test

By utilizing antigen-antibody interactions, the Widal test is utilized to find particular antibodies in the serum of typhoidpatients. In this test, a dead *salmonella* solution containing certain antigens is combined with serum. If the patient has serum antibodies against certain antigens, they clump together and adhere to them. The test is unsuccessful if clumping does not take place. The Widal test takes a lot of time and can provide considerable false positive results. Additionally, in newly infected individuals, it might be mistakenly negative. The Widal test, however, quantifies the specimen with titres as opposed to the Typhidot test.

Rapid diagnostic tests

Rapid diagnostic tools like Tubex, Typhidot, have demonstrated a mediocre level of diagnostic precision.

Typhidot

The foundation of typohidot is the existence of certain IgM and IgG antibodies to a particular 50Kd OMP antigen. A specific *S. typhi* outer membrane protein is attached as fixed test lines on a cellulose nitrate membrane, which is used for this test. It distinguishes between IgM and IgG antibodies. IgG indicates a remote infection, while IgM indicates a recent infection. This kit's sample pad contains colloidal gold-anti-human IgM or IgG antibodies. The sample will react and turn red if it includes IgG and IgM antibodies against certain antigens. Within two to three days of infection, the typhidot test yields a positive result. A positive test is indicated by two coloured bands. A negative test is indicated by a single control band. An invalid test is indicated by a single first fixed line or no band at all. The main drawback of Typhidot is that it only accepts positive or negative values rather than numbers.

Tubex test

Two different types of particles are used in the Tubex test blue indicator particles coated with O9 antibody and brown magnetic particles coated with antigen. If any antibodies are found in the blood during the test, they will bind to the brown magnetic particles and drop at the bottom, while the blue indicator particles will stay in the solution and produce a blue tint, indicating a positive result. The blue particles bind to the brown particles and sink at the bottom, creating a colourless solution, which indicates the test is negative if the serum does not contain an antibody.

Correspondence to: Hamida Jdir Department of Biology, University of Carthage, Tunis, Tunisisa, E-mail: jdir.hamida@yahoo.fr

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