

# Investigating The Relationship Between Malaria Parasitaemia And Widal Positivity

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## Abstract

Malaria and typhoid fever are life threatening illnesses of tropical and subtropical regions of the world with almost similar clinical manifestations. An investigation on the relationship between malaria parasitaemia and widal positivity was carried out among 100 patients who consulted doctors at the general out patients department of the Nnamdi Azikiwe Teaching Hospital, Nnewi . Blood samples were collected from patients who manifested clinical symptoms of malaria/typhoid fever . Thick blood films were made and stained with Giemsa staining technique for malaria parasite while tube agglutination test was carried out for widal positivity. Blood , urine and stool samples of patients with high widal titre were cultured in appropriate media. 41.02% of the patients were malaria parasite and widal test positive (somatic antigen) while 27.27% were positive for flagellar antigen. There were occurrence of mixed reaction in widal test among the patients tested. There was no significant relationship between malaria parasitaemia and reactivity of serum with typhoid fever ( $p < .05$ ). No *Salmonella* species was isolated from the body fluids cultured. The poor performance of widal test in some laboratories, instant conclusion and poor interpretation of results by prescribers should be checked and base line titre of each location determined.

## INTRODUCTION

Malaria is a parasitic infection transmitted from person to person by infected *Anopheles* mosquito while typhoid fever is a bacteria infection caused by *Salmonella* species . Both are widely spread in the tropics and subtropics. They are life threatening illnesses with similar clinical manifestations. Malaria is a singular cause of morbidity and mortality in Nigeria where a child dies of malaria attack every 30secs (WHO,1998). There has been a rise in the number of complex emergencies of malaria cases affecting large civilian population with war or civil strife, food shortages and population displacement resulting in excess mortality and morbidity (Eneanya,1998). Approximately 300-500 million cases of malaria and 3 million death occur annually worldwide, mainly in tropical developing countries (Olliaro et al, 1996). It represents 15-30% of the hospitalization cases and 15-20% of the registered death in the paediatric services(Ouledi,1995) while traveling internationally (Finlay and Falkow,1998). It affects 12.5 million persons each year in the developing world (Rao et al,1986). The organism causing it ,*Salmonella typhi* lives only in humans , and a small number of persons called carriers, recover from the disease but continue to carry the bacteria (John et al 1984).Both ill persons and carriers shed *S.typhi* in their

faeces. Typhoid fever affects 17 million people worldwide every year with approximately 600,000 deaths (WHO,1996). Between the year 1607 and 1624, 6000 settlers died in Virginia, USA due to an outbreak of typhoid fever. In 1906, 53 people got infected while 5 died due to food contamination with *Salmonella* species by a carrier Mary Mallon in Oyster Bay, New York (WHO,1975). In the year 2001, 3 million children died of dehydration caused by diarrhea. 80% of them, in the first 2 years of their life, 57000 a week, 8000 a day 6 a minute and one every second (Serengbe et al ,2002). The main causes of diarrhea are poor personal and food hygiene and lack of clean drinking water. Organisms are transmitted by hands and fomites, poor sanitation and improper separation of sewage from drinking water. Typhoid fever as reported by some experts have caused a lot of mishap in both children and adults alike. In Nigeria, Onuigbo (1990) reported a case of typhoid at the UNTH, Enugu. Ikeme and Anan,(1996) observed that of all the 214 positive cases of *S.typhi*, males ranking high with 117 cases and 97 females and the age distribution of the disease range from 20-30 years age group. Nsutebu, et al (2002) reported an increase in occurrence of typhoid fever in Cameroun. The reasons explored include an over diagnosis of the illness related to poor performance of the widal test in laboratories and interpretation by prescribers. The high

prevalence of malaria is an established fact but it was only within the past 5 years that an unusually high number of illnesses have been diagnosed as malaria co-existing with typhoid fever (Ammah et al, 1999). Out of 200 patients presenting with, 34 had concurrent malaria and typhoid fever. A report by Oguoma et al,(2008) also stated that out of 2127 confirmed malaria cases, 1381 had typhomalaria in Gezawa community in Kano State. Despite these similarities in the manifestation and symptoms of malaria and typhoid fever, the sources transmission and causative organisms remain different.

## MATERIALS AND METHODS

### STUDY AREA

Nnamdi Azikiwe University Teaching Hospital, Nnewi which is the study area serves as a common referral centre to all the clinics and hospitals in Anambra State and its environs. The study was conducted with patients who consulted doctors at the general out patient department. The study was carried out during the dry season and the patients were those who showed symptoms such as fever, headache, anaemia, fatigue, vomiting which were suggestive of malaria or typhoid fever as specified in the laboratory request form.

### SAMPLE COLLECTION

100 patients were recruited into this study and screened for typhoid antigens using tube agglutination method. Those who were non reactive to typhoid fever antigen were dropped out but those who reacted to titre ( $\geq 80$ ) were included in the study. Patients who were malaria parasite and Salmonella negative were interviewed on the intake of drugs since last seven days. 10mls of blood were collected aseptically for malaria parasite, widal test and blood culture respectively. Urine and stool samples were also collected and analyzed. Malaria parasite test was done using thick blood film and stained with Giemsa stain, widal test was done using tube agglutination test while blood culture was done using Robertson's cooked meat medium and subcultured appropriately. Stool culture was done using Selenite F and other appropriate media; urine culture was also done using MacConkey blood and Cystine- lactose electrolyte deficiency (CLED) agar plates. All the organisms isolated were identified using gram staining technique and biochemical tests.

## RESULTS

Among the 100 patients examined, no Salmonella species was isolated from their blood, urine and stool samples although there were high titre of the antigen in the widal

screening test. 32(41.02%) patients were positive of malaria parasite and also had high titre of the widal (somatic) antigen where 46(58.97%) were positive of malaria parasites but did not react to the widal antigen (table 1). There was no relationship between malaria parasitaemia and typhoid fever.

**Figure 1**

Table 1: Relationship between malaria parasitaemia and reactivity of serum with typhoid (somatic) antigens.

Widal Status	Malaria Status		
	Positive	Negative	Total
Positive	32(41.02%)	13(59.09%)	45
Negative	46(58.97%)	9(40.90%)	55
Total	78	22	100

Chi-square=0.498 ( $P < 0.05$ )

21(27.27%) patients were positive of malaria parasite and had high titre of widal (flagella) antigen while 56(72.72%) patients were positive of malaria but negative to widal antigens. Statistical analysis showed that there is no relationship between malaria parasitaemia and reactivity of serum with paratyphoid antigen. (table 2)

**Figure 2**

Table 2: Relationship between malaria parasitaemia and reactivity of serum with paratyphoid (flagellar) antigen.

Widal Status	Malaria Status		
	Positive	Negative	Total
Positive	21(27.27%)	14(60.87%)	35
Negative	56(72.72%)	9(39.13%)	65
Total	77	23	100

Chi-square=2.0209 ( $P < 0.05$ )

## DISCUSSION

No Salmonella species was isolated from the body fluids of the patients who had high titre of the antigens in the widal screening test which may be attributed to the fact that the organism has perforated the intestine and invaded the blood stream resulting in antibody production hence pyrexia among individuals. This is in agreement with the work of Nsutebu et al (2002) who noted that increase in positivity of the widal test was due to over diagnosis of illness by some clinicians. This must have been the case with the findings of Onuigbo (1990) and Oguoma et al, (2008) observed that 70% and 64.9% patients who were diagnosed as typhoid fever based primarily on widal test results were confirmed to be malaria parasite positive though they failed to respond to chloroquine but responded to Fansidar. The high titre of Salmonella antibody may be due to increasing exposure of the population to typhoid organisms at sub-clinical level.

Although so many fevers mimic typhoid fever, the major cause of fever in Nigeria is malaria (Agbonlahor, 2004). This similarity of clinical symptoms makes the clinicians to confuse the two conditions because almost all queried typhoid situations come out as positive. This is partly due to the fact that the test may not be properly carried out or that the kits may have been adulterated. He discouraged reliance on Western base-line titres (1:40 or 1:80) because in Nigeria, there is constant exposure to the organisms due to poor sanitary conditions and intake of untreated water. The number of fever cases diagnosed as malaria co-existing with typhoid fever is overestimated (Ammah et al 1999). He observed that the high prevalence of malaria is an established fact in Cameroun but high number of illness have been diagnosed as malaria co-existing with typhoid fever. Widal screening test is widely used as the sole laboratory test for diagnosis of typhoid organisms, he reported that among the 200 patients presented with fever, 47.9% had concurrent malaria and typhoid fever based on widal screening test as compared with 17.0% based on bacteriological diagnosis. It would appear based on this study that many individuals not suffering from typhoid have high titres of typhoidal antibody in their blood which could be attributed to poor personal and public hygiene, lack of pipe borne water and low enlightenment, added to this problem is the increasing importance of 'pure water', majority of which are produced under unhygienic conditions (Agbonlahor, 2004). The base line titre in our community must have to be established/ understood so that proper interpretation will be given to the widal tests results carried out in laboratories. It is pertinent to note that Nigerians rely on imported antigens for the widal tests. This apart from lending itself to adulteration by local suppliers who are usually profit-crazy, the potency of the antigen may also be affected by poor handling and storage on transit which also leads to wrong results. It was observed that different widal kits gave different reactions on patients tested. Laboratories believe so much in serological investigations whereas

cultural isolations of the causal organism should be definitive of typhoid fever.

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