

## Typhoid and Malaria Co-infection: Study from a tertiary care Center, Meerut

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### Abstract

**Background:** Both typhoid and malaria are diseases of epidemiological importance globally. Malaria and typhoid fever are among the most endemic diseases in the tropical and developing countries. Here in this study authors attempt to find out rates of concurrent typhoid and malaria infection.

**Methods:** A cross sectional study was done from 1 May 2019 to 30 April 2020. A total of 865 samples in different age groups were analyzed in the microbiology laboratory for the diagnosis of typhoid fever and malaria co-infection. Peripheral blood smear examination, Rapid diagnostic test (RDT) for malaria, tube Widal test and typhi dot were done for the diagnosis of Malaria and typhoid infections respectively.

**Results:** Out of 865 febrile serum samples tested 382 (44.16%) were positive for typhoid (Widal test O and H titres  $\geq 1:160$ ), 260 (30%) were positive for malaria and 17 (2.6%) were positive for both typhoid as well as malaria. In co-infection cases 11 (64.7%) were male. While co-infection was maximum in 21-30 (41.1%) years age group.

**Conclusions:** The current results indicate that this area is endemic for malaria and typhoid and co-infection. Its infection is prevalent in all age groups at varying degrees. More diagnostic methods need to confirm our finding.

**Keywords:** Co-infection, Malaria, Typhoid, Serodiagnosis

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### I. Introduction

Both diseases are communal in various nations of the world wherever the prevailing ecological environments of warm tropical temperature, poor hygienic practices, poverty, and ignorance are present. These two infections have been concomitant with poverty and underdevelopment. Malaria is a parasitic disease caused by four protozoan parasites in humans known as *P. falciparum*, *P. vivax*, *P. malariae*, *P. knowlesi*. (ORGANIZATION, 2010)

Malaria and typhoid are common causes of fever. Concurrent infection with two agents can result in an illness having overlapping symptoms creating a diagnostic dilemma for the treating physician. (Chrispal A, 2010) Febrile illness is a common clinical syndrome for dengue, typhoid, Japanese Encephalitis, chikungunya, leptospirosis, influenza and malaria.

An association between malaria and typhoid fever was first described in the middle of the 19th century and was named as Typo malarial fever by the United States Army. However, in the end of the 19th century the developed laboratory test rejects this theory, because they found that it was either one thing or other or in rare instance it is co-infection with both *Salmonella typhi* and the *Plasmodium* species (RAO; SOWMYA, 2015).

This study was carried out to determine the prevalence of typhoid and malaria co-infection in the tertiary care center Meerut, North India.

### II. Methods

A retrospective analysis of 865 patients' sera with febrile illness from 1 May 2019 to April 2020 were selected for the study. The study was carried out at Mulayam Singh Yadav Medical College and Hospital, Meerut, Uttar Pradesh, India.

Demographic data including age, sex and detailed history of onset of symptoms were recorded from medical records. Malarial infection was diagnosed by peripheral blood smear & malarial antigen rapid card test.

Serodiagnosis of *Salmonella typhi* infection was conducted by typhi dot (Rapid card test) & Widal test which is a tube agglutination test and detects antibodies against O and H antigens of *salmonella typhi* and H antigens of *salmonella paratyphi A and B*. Titer value of  $\geq 1:160$  for both O and H was considered as clinically significant in single acute phase samples which is the baseline titer for this region.

**Inclusion criteria-**

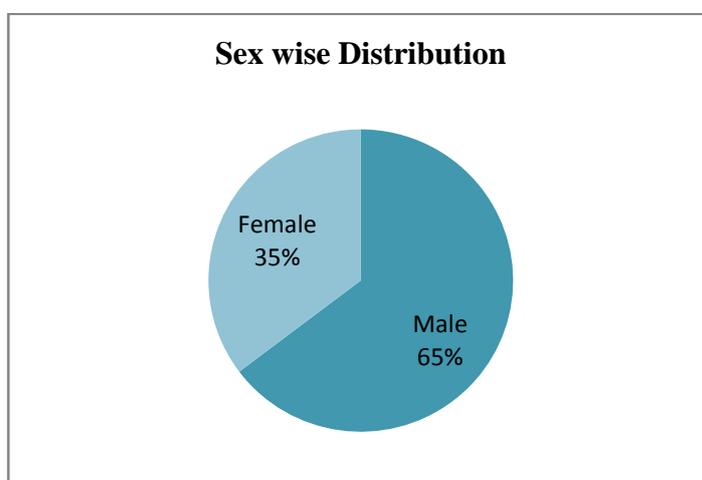
Patients presenting with undifferentiated fever of minimum 5 days with clinical suspicion of typhoid or malaria. Patients of age from >10 years onwards.

**Exclusive Criteria-**Patients with any other bacterial or parasitic infections were excluded from the study to reduce the chance of false positive results.

**Sample Collection-**The blood samples were collected from the affected individuals after informed consent. Three milliliters (3ml) of blood sample was collected from each patient into sterilized EDTA® falcon tube by the trained technician,

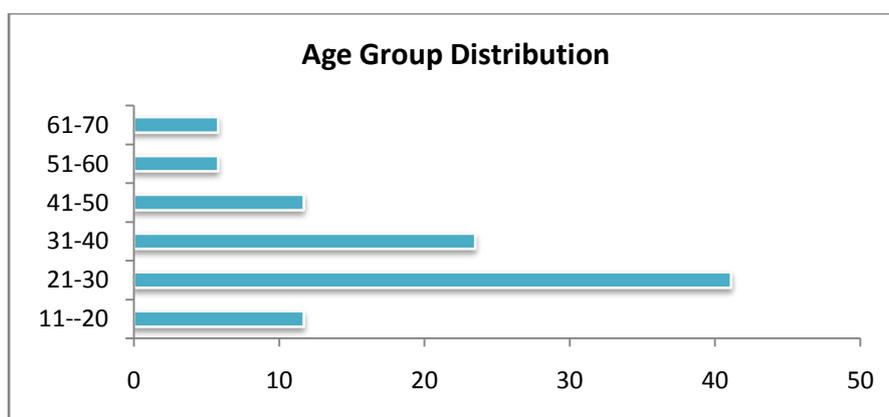
**III. Results**

In the present study 865 febrile sera samples were tested in which 382 (38.2%) were positive for typhoid (widal or typhi dot both), 260 (17.6%) were positive for malaria (peripheral blood smear & rapid malaria antigen) only and 17 (6.9%) were positive for both Salmonella as well as Plasmodium. Maximum 11(64.7%) correlation of typhoid with malaria was males whereas 6(35.3%) in females.



**Figure 1: Age wise distribution of co-infected patients (n=17)**

Out of the 642 cases the maximum patients belonged to age group of 21-30 7(41.1%) years while second most affected age group was 31-40 years 4(23.5%) followed by 11-20 age group & 41-50 age group found only 2 (11.7%) case while 1(5.8%) cases each in 51-60 age group & 61-70 age group.



**Figure 2: Age group distribution of co-infected patients (n=17)**

**IV. Discussion**

Prevalence of co-infection of malaria and typhoid parasite is low. We found the prevalence of co-infection in our region which was 2.6%. Similar low finding reported of co-infection 1% by Matlani et al., New Delhi, Alhassan. H, Nigeria was 1.33%. In contrast our study, higher prevalence reported by (15.6%) Katiyar et

al. 2020, 14-9% by Samal et al., and AbdElseed et al., 3.38% by Sharma B et al. respectively. There is paucity of data regarding the burden of co-infections from India” in previous study showed that two case reports, Karnataka and Andhra Pradesh in the year 2015 and 2013 each one. Study by Shukla S et al in the year 2014 (reported 8.5% rate of co infection), and study by Verma D et al., 2014 which observed 1.6% of typhoid and malaria co-infection by peripheral smear examination while 8.5% by serological method.

In our study, out of 865 cases of co-infection, 64.7% were positive in males while 35.3% cases in females, study by Sharma B et al., reported 75% in males & 25% in females rate of co-infection. Our findings are corroborative with the findings of these studies

In the study authors found maximum 17(6.9%) co-infection cases were in age group 21-30 years, followed by 4(%) 31-40 years age group, 2(11.7%) each 11-20 & 41-50 age group whereas 1(5.8%) in 51-60 & 61-70 cases in each group. Similar findings reported by Sharma B. et al., the mean age was 28 ±12 years and majority of the patients (65%) were adults.

On comparing the data with the above mentioned authors and some other and the other reports from Uttar Pradesh, prevalence of co-infection cases in our study was found to be very less.

## V. Conclusion

The present study concludes that co-infection of typhoid and malaria is common in our region. The prevalence of Malaria & typhoid co infection was the same as compared to other studies. Further studies are integral to determine the true rate of co-infection. Further, studies should be done on the other potential risk factors of malaria and typhoid fever co-infection in different seasons and different study areas. The importance of improvement in sanitation and hygiene cannot be ignored to control these two important public health diseases.

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