DISCUSSION

Typhoid fever is diagnosed traditionally by blood culture and widal test though other tests i.e. urine culture, stool culture, marrow culture etc, can also diagnose it. Out of these above mentioned tests, widal test is the only simple test and is most widely used, but even this is useful only after 1 weeks of illness. The only other test, which can diagnose typhoid fever earlier than widal test is blood culture which is not a simple test and it has its own limitations.

Since typhoid fever is a common cause of acute febrile illness, there is need of test which is simple and can diagnose typhoid fever early.

Diazo test has given some hope as a simple bedside test which can diagnose typhoid fever even in first week of illness.

Present study was aimed to evaluate the diazo test in the diagnosis of typhoid fever.

The study comprised of 63 patients. Out of these, 27 patients later on proved to be cases of typhoid fever because of positive widal test, while rest of the 6 patients served as controls in which widal test was found to be negative.

It is evident from table I that maximum number of patients of typhoid fever belonged to age group 6-10
years (59%). This data just gives a clue that in pediatric age group, typhoid fever is commoner in school-age children. Only 12% of cases of study group were more than 11 years old. Youngest patient in this study was 2.5 years old male child, while the oldest patient was a 13 years old female child.

Kaul et al (1990) in their study of 48 cases found that 45.8% of cases were in age group of 0-5 years while in study done by Pandey et al (1990) only 32.3% cases were in age group less than five years.

Kapoor et al (1990) in their study on typhoid fever in children, found that 53.3% of cases came from age group of ≤5 years.

Mishra et al (1991) also reported that 38% of these patients came from age group 2-5 years, while rest of the cases were in the age group 5-19 years.

Sharma and Gathwala (1992) in their study on 69 children found that 21.5% patients were in age group less than five years, 32.3% were between 6 to 10 years and 46.3% were between 11 to 14 years.

As far as sex is concerned table II shows that 75% of the total patients under study were males. Among typhoid fever cases 85% were males, while 66% of controls were males. The male preponderance could be a reflection of the traditional Indian family taking more interest in the male sib in all spheres including medical attention.
In the study conducted on typhoid fever by Biswal et al (1993), 70% of the patients were of more than 5 years of age, while rest of them were of less than 5 years of age.

Forty four percent of the cases in our study were from/socio-economic background (Table III), and 33% were from lower middle strata. Together they constituted 77% of the cases. Only 23% of cases were from middle socio-economic group. None of the case, however belonged to higher income strata group. This finding was expected as typhoid fever is spread by faeco oral route and failure in personal hygiene and particularly in public health precautions commonly results in appearance of typhoid fever.

In this study main criteria for selection of cases was history of fever for more than 5 days. It is evident from the table IV that 48% cases were having fever from 5-8 days and 52% cases were having fever for more than 8 days. Average duration of fever at the time of first visit to this hospital was 9.25 days per patients. These results were comparable to other studies done. Kaul et al (1990) in their study reported average duration of fever from 9.23 to 10.18 days. Sharma and Gothwala (1993) in their study on multi drug resistant typhoid fever found that average duration of fever was from 13.1±9 days to 15.8±8.2 days.
As shown in table V apart from fever, other common clinical features were splenomegaly (80% cases), hepatomegaly (66%, and bronchitis in 41% cases. Pallor was present in 30% cases, while CNS involvement was found in 15% cases. Various workers in the past have commented upon the clinical profile of cases of typhoid fever.

Marmion (1952) found splenomegaly in up to 70% of cases during the period of illness.

Mishra et al (1991) in their study on multi-drug resistant typhoid fever reported that splenomegaly was detected in 60% of cases, while hepatomegaly was present in 90% cases. They also noted bronchitis in 35% of their cases.

Sharma and Gathwala (1992) reported splenomegaly in 36% cases, while hepatomegaly in 25.8% of cases. Similar results were obtained by Kohl et al (1990).

Biswa et al (1993) reported splenomegaly in 65% of cases and hepatomegaly in 62% of cases of typhoid fever. Features of bronchitis were present in 21% of cases in their study.

The reason for high percentage of splenomegaly in our patients might be endemicity of malaria in Bundelkhand region.

It is evident from table VI that out of 27 proven cases of typhoid fever, 89% of cases had taken oral antibiotics prior to admission in our hospital. However, 3 cases were giving the history of drug intake
but the nature of antibiotic could not be confirmed from the history or from the other records. Out of the cases taking antibiotics orally, all of them were doing so for more than 3 days and 25% of them were taking oral antibiotics for more than 5 days (Table VII). On enquiring about the nature of antibiotics, it was found that most of patients were either taking Amoxycillin or Ampicillin or Ampicillin and Cloxacillin combination or chloramphenicol, while some patients were even on quinolones.

As shown in table VIII, 20 out of 27 cases (74%) were also taking parenteral antibiotics and table IX shows that 75% of them were taking these antibiotics for more than one day.

It is evident from table X that leucopenia was present in 19% of the cases, while only 3% of control group (1 patient) were leucopenic. Majority of cases were having leucocyte count in normal range of 4000-11000 cells/cumm blood.

Mishra et al (1991) in their study found leucopenia in 12% of cases, while 72% of cases were having leucocyte count in normal range.

Keusch GT (1994) reported leucopenia in 25% cases of typhoid fever and majority was having normal leucocyte count.

Leucocyte count obtained in our study was comparable with other studies and no significant difference was found.
It is evident from table XI that out of total 63 cases only 11 cases showed a positive blood culture for S. typhi and all of them were widal positive too.

Keusch GT (1994) had reported that 90% of cases of typhoid fever give positive blood culture for S. typhi in first week of illness and the positivity falls to 50% after 2nd week of illness. He further reported that a positive blood culture is usually obtained when patients are not on antibiotic and appropriate culture techniques are employed.

Ananthnarayan and Panikar (1989) also found that blood culture is positive for S. typhi in 90% cases of typhoid fever in first week of illness and in 60% cases after 2nd week of illness. These values are obtained only if blood culture is done prior to administration of antibiotic and proper culture techniques were employed.

The low blood culture positivity of only 40% observed by us can be attributed to the fact that all the cases had taken either oral or parenteral or both the forms of antibiotics, atleast for 3 days or more prior to hospitalization and blood culture estimation.

As widal test was performed in each and every patients and it was the main criteria in deciding cases and controls, all widal negative patients served as controls.

According to Manson Bahr and Wilcocks (1982) upper limit of negative widal test is 1 : 30 dilution for 'H'
antigen and 1:50 dilution for 'O' antigen. In our study
widal test in dilution of 1:80 for 'O' and 'H' antigen
was taken as positive reaction.

It is evident from table XII that all the cases
were widal positive in the dilution 1:80 or more on further
categorising them, it was seen that 11% cases were widal
positive in dilution 1:80 on first instance, while 55%
cases were positive in dilution 1:160. Thirty three
percent cases however, had a titre of 1:320 for 'O'
antigen on first widal test.

When widal test was repeated after 3-4 days, it
was seen that the 3 cases, which had widal positivity in
dilution 1:80 recorded a higher titre and became positive
in dilution 1:160. Out of 15 cases which had widal
positivity in dilution 1:160, only seven cases showed an
increasing titre of 1:320 on serial widal test.

Diazo test was performed in each and every
patient every day from the first day of contact. Even if
any patient was found Diazo negative on very first day, we
continued to repeat the test for atleast four days and
stopped doing so if patient remained Diazo negative for
these four days.

If on very first day, Diazo was found positive
in any patient then test was done daily for eight days or
till the date of discharge of patient, which ever is earlier.
Total 352 Diazo tests were done on 63 patients. Out of these, 208 Diazo tests were done on the 27 widal positive cases and rest 144 tests were done on the 36 widal negative (Table XV) cases which served as controls in the present study.

Diazo test was found negative in all the 36 controls from the very first day of study and remained so throughout the course of their illness (Table XIV) (specificity = 100%). Such a high specificity was expected as measles, tuberculosis and typhus cases were excluded from the study as they can give false positive results.

Out of 216 Diazo tests done on 27 widal positive cases, 94 tests were positive. All of these 94 tests were done during the early part of illness, while rest 122 negative Diazo tests were done after defervescence of fever (Table XVI). As evident from table XIV, two widal positive cases remained Diazo negative throughout the course of their illness, while rest 25 cases were Diazo positive (Sensitivity = 85.2%).

An interesting finding from table XVII, is that 25 cases were Diazo positive from the very first day of study, and at that time fever was also present in all the cases. On third day of study only 20 patients were having fever and same patients were Diazo positive too. On day 4th, only 10 cases were having fever, while 15 cases were still Diazo positive. Similarly on day 5th, only 2 cases were having fever against 5 Diazo positive cases. After
day five onwards, no patient was having fever, while only 2 cases were Diazo positive on day sixth and one on day 7th (Table XVII). These findings clearly indicate that Diazo test has good correlation with clinical illness. As soon as fever started subsiding after starting treatment, cases also started becoming Diazo test negative.

It is evident from table XVIII that Diazo test has good correlation with defervescence for fever and thus with clinical improvement of patient of typhoid fever.

Diazo test was positive in 92.6% of cases of typhoid fever when disease was in active state. As shown in table XVIII, in 44% of cases, Diazo test became negative on the same day of defervescence of fever, while in another 44% cases Diazo test remained positive for one or two days after fever subsided. Only in 12% of cases the Diazo test became negative a day prior to defervescence of fever.

Similar inferences were drawn by Raghuraman et al (1992) in their study conducted on 30 cases having suspicion of typhoid fever. Out of these 30 cases 12 cases were proven cases of typhoid fever on the ground of positive blood culture for S. typhi while rest of the 18 cases were taken as controls. They observed that among 12 cases, 11 were Diazo positive too and only one case was Diazo negative. Diazo test in eleven cases remained positive throughout the period of illness and became
negative only with clinical response. They calculated the sensitivity and specificity of this test and reported a sensitivity of 92%, while the specificity was 93%.

A very interesting observation of our study as regards the Diazo test, a simple bedside technique for early diagnosis of typhoid fever was a higher specificity of this test than that observed by Raghuraman et al (1992).

A higher specificity in our study was possible as we excluded diseases like measles, tuberculosis and typhus which give a false positive reaction. Besides being a highly specific test, the diazo test is also not adversely affected by the administration of antibiotics, which is the greatest drawback with the positivity of blood culture, the gold standard in the diagnosis of typhoid fever.

Thus in a nutshell our observation reveal that Diazo test besides being a simple, early bedside test is also highly specific and should be considered as a diagnostic aid in the early diagnosis of typhoid fever.