SUMMARY

AND

CONCLUSION
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The present study was conducted in the department of Paediatrics in collaboration with department of Microbiology, department of Pathology and department of Obstetrics and Gynaecology at M.L.B. Medical College, Jhansi over a period of one year from July, 1992 to June, 1993.

The primary aim of our study was to evaluate the role of three laboratory tests viz., micro ESR, C-reactive proteins and leucocyte alkaline phosphatase activity in early diagnosis of neonatal sepsis. At the same time we also observed clinical, bacteriological profile and antibiotic sensitivity pattern of neonatal sepsis.

A total of 61 cases were selected for the study. The case material was broadly divided into control group and study group. Study group was further subdivided into three groups. Depending upon positivity of blood culture, 14 culture positive cases constituted the group of proved sepsis, while remaining 14 culture negative cases were included in probable sepsis group. 18 cases of superficial infections were also included in our study.
Values of above mentioned three tests were determined in 3 subgroups of infections and compared with that of 10 normal healthy full term babies.

Further an attempt was also made to observe the effect of gestational age on values of micro ESR, C-reactive proteins and leucocyte alkaline phosphatase activity in septicemic as well as healthy neonates. Accordingly 5 preterm babies without any risk factor for development of neonatal sepsis were also included in the study.

I. Gestational age and Birth weight:

Our findings revealed that incidence of prematurity was higher in proved sepsis (35.7%) than that observed in probable sepsis (28.5%) and group of superficial infections (27.5%).

The case material was also classified as per WHO criteria (1961) into two group on basis of birth weight. It was observed that 57.1% cases of proved sepsis and 64.3% cases of probable sepsis were below 2.5 kg of birth weight while incidence of low birth weight babies in group of superficial infections was as low as 38.9% only.
II. **Sex and Age** :

High incidence of neonatal sepsis among male babies reported by various workers was also confirmed by us. We observed, that 76.5% cases of proved sepsis were male babies. Furthermore, this incidence was much higher than 64.3% and 50% observed in group of probable sepsis and superficial infections respectively. Majority of the cases (72%) of proved and probable septicemia were below ten days of age, signifying the fact that depressed immunological responses during this period is partly responsible for the increased incidence of sepsis in early neonatal period.

III. **Clinical Features** :

Like majority of other studies symptoms and signs of neonatal sepsis also remained vague, nonspecific and subtle in the present study. The most common and consistent presenting symptom of neonatal septicemia was refusal of feeds, which was present in 82.2% proved and probable cases of septicemia, while lethargy was commonest clinical sign (64.2%) encountered by us. Temperature changes (50%), seizures (42.8%), respiratory distress (28.3%) and jaundice (25%) were the other common manifestations.
IV. **Bacteriological profile**:

Among 26 suspected cases of neonatal sepsis, 50% cases were found to be bacteriologically positive. We could isolate only two micro-organisms viz, *staphylococcus aureus* in 57% cases and *E.Coli* in 43% cases. We also observed clinical and bacteriological profile of superficial infections and found that umbilical sepsis was the commonest, as it was present alone in 50% cases of superficial infections. Conjunctivitis (16.5%) and pyoderma (11.5%) were detected in a lesser extent, whereas mixed infections were found in 22.2% cases. *Staphylococcus aureus* was yielded in 31 out of 32 swab culture of superficial infections sent for bacteriological examination. It supported the various reports that handling of baby by uncleaned hand, poor sterilization, nursery colonisation are the factors which promote the growth of *staphylococcus aureus*.

V. **Culture sensitivity pattern**:

A significant finding of the antimicrobial sensitivity pattern of blood culture was low sensitivity of commonly used antibiotic ampicillin, which was found to be effective in only 53% cases of septicemia. However, the sensitivity of gentamicin, second commonly used drug was definitely better, as it was effective against about two third of cases
(78.3%). Another important finding reported by various workers and also confirmed by us, was superiority of third generation, cephalosporins viz, cefotaxime (78.5%) ceftriaxone (92%) and newer aminoglycoside netlimicin (92%) in the treatment of neonatal sepsis. One interesting finding reported by us was 100% efficacy of ceftriaxone and netlimicin against E. coli.

VI. **Micro ESR estimation:**

Micro ESR was measured by standard heparinised capillary tube of 75 mm length and 1.5 mm diameter. Value of more than 10 mm per hour was considered as abnormal. Our findings revealed, that values of micro ESR were elevated in 78.5% cases of proved sepsis, 64.3% cases of probable sepsis and 38.8% cases of superficial infections. Moreover, value observed in proved sepsis (15 ± 7.36) and probable sepsis (12.85 ± 8.44) were also significantly higher than values found in cases of superficial infections (9.50 ± 4.8) and in control group (6 ± 3.05). On statistical analysis elevation in values of micro ESR was highly significant (P ≤ 0.001) in proved sepsis, significant (P ≤ 0.05) in probable sepsis when compared to normal healthy neonates. No significant variation in the micro ESR value was, however, found between the
control group and cases with superficial infections, nor was there any statistical significance between proved and probable sepsis (P 7.05).

We also analysed our data in full term and preterm babies separately to observe the effect of gestational maturity on values of micro ESR. Our findings revealed that values were more or less equal in two gestational age group among control as well as three study groups. The difference in values was also statistically insignificant. This confirmed that gestational age per se had no effect on values of micro ESR.

VII. C-reactive Proteins:

C-reactive protein an acute phase reactant is elevated in acute inflammatory conditions. It was detected by commercial kits using latex agglutination method in present study. Level above 6 ug/ml was considered as abnormal. Positive CRP test was observed in 64.2% cases of proved sepsis and 71.5% cases of probable sepsis. However, percentage of detection was quite low in cases of superficial infections (27.8%). Like micro ESR we analysed CRP test in full term and preterm babies separately and observed that the percentage of detection was not significantly different in the two gestational age group.
VIII. **Leucocyte alkaline phosphatase activity**:

Cytochemical method described by Sirola and Sirola (1957) was used by us to determine LAP activity. The normal score obtained in full term healthy babies was 128.5 ± 19.67, which was definitely higher than that observed in proved sepsis (102.86 ± 18.53) and probable sepsis (109.07 ± 14.98). Value observed in cases of superficial infection was more or less similar to (122.94 ± 21.28) that observed in control group. On statistical analysis, we observed that difference in values was statistically highly significant in proved sepsis ($P \leq 0.01$) and significant in probable sepsis ($P \leq 0.05$) when compared with control group. However, the difference in values of superficial infection and control group and between two group of sepsis were statistically insignificant ($P \leq 0.05$). Few workers in the past, have reported low values of LAP in preterm babies, but our findings revealed that there was no significant difference in scores of LAP between full term and preterm babies in control as well as three study group. So it is concluded that like micro ESR, C-reactive proteins and leucocyte alkaline phosphatase activity is independent of gestational maturity.
IX. **Comparison of two tests**:

We also compared the efficacy of two tests viz, micro ESR and C-reactive proteins by statistical tests. Our findings revealed, that micro ESR was more sensitive but less specific test when analysed in bacteriologically proved cases of sepsis. It also had high negative predictive accuracy, while positive predictive accuracy was low. Results were similar for micro ESR and CRP when compared for all suspected cases of septicemia irrespective of blood culture in all statistical test except for negative predictive accuracy which was equal for both diagnostic test in this group. Role of these two test was also evaluated in cases of superficial infection and it was observed that both micro ESR and CRP were highly specific but poor sensitive tests for superficial infection.

**Conclusions**:

The following inferences were drawn from the present study:

1. Low birth weight babies are more vulnerable to develop neonatal infection.

2. Male babies and babies of early post natal age group are relatively at a high risk to develop neonatal infection than female babies and babies of late neonatal period.
3. Neonatal septicemia usually presents with vague, nonspecific symptoms like refusal of feeds, lethargy, temperature changes, seizures etc.

4. Staphylococcus aureus and E. Coli are common organism and responsible for neonatal sepsis in this region, with a higher percentage of staphylococcal septicemia than that observed with E. Coli.

5. Bacteria responsible for neonatal sepsis have become resistant to commonly used drugs like ampicillin. Third generation cephalosporins and newer aminoglycoside, netinincin, are very effective for treatment of neonatal sepsis.

6. Micro ESR and C-reactive proteins are useful, rapid, simple and reliable tests to diagnose neonatal sepsis, these two test can be performed without any laboratory facilities at peripheral hospital.

7. Leucocyte alkaline phosphatase activity is also a reliable and important test for neonatal sepsis but the procedure is time consuming and requires high degree of precision and trained personnel.
8. *Micro ESR*, C-reactive proteins and leucocyte alkaline phosphatase activity is not useful in cases of superficial infections.

9. Gestational maturity per se has no effect on values of *micro ESR*, C-reactive proteins and leucocyte alkaline phosphatase activity.

10. *Micro ESR* was found to be more sensitive but less specific than CRF which had high positive predictive accuracy and low negative predictive accuracy is neonatal sepsis.