

Analysis of Microbiological Culture Specimens in Shree Birendra Hospital, Chhauni



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Abstract

This is a retrospective study of microbiological culture specimens processed between Baishakh 059 to Chaitra 059 over a span of one year (May-April 2003). During this period a total of 9430 samples were asked for culture and 1948 i.e. 20.6% showed growth. This study showed that commonest specimen was blood culture for salmonella (66.5%) which was positive in 1009 (16.2%) of cases. Other common specimens were urine, pus and sputum showing 55.31%, 22.0% and 7.5% respectively.

This study also showed increased demand of blood culture samples in month of Ashad, Shrawan and Bhadra. However, nonblood culture samples were almost uniform in distribution through out the year (average 261/month).

The commonest organisms isolated in urine, pus and sputum culture were *E. coli* in 79.5%, *staphylococcus aureus* in 66.2% and *Klebsiella* and *E. coli* in 36.5% each respectively.

Key Words :

Microbiology specimens, culture, salmonella, urinary tract infections, pus, sputum.

Introduction

The causative factors of disease namely agent, host and environment form an epidemiological triad. The biologic agents like viruses, bacteria, fungi, protozoa, rickettsia etc. have high importance leading to infectious diseases in medical practice in the past, present as well as in the future because of their enormous frequency and contagiousness. However, development in sanitary engineering, immunizations, vector control, early diagnosis and specific chemotherapy have modified the situation favorably. One should not forget that these diseases are easily prevented and more easily cured than any other major groups of disorders.

Culture helps in isolation of etiological agent by cultivation in artificial media though it is time consuming and complex. It provides the most definite diagnosis. However, proper specimen collection, rapid transportation to the laboratory and proper correlation of microbiological report with the patient's symptoms are some important factors. This study will throw some light upon the types of culture specimen, distribution in different months and different aetiological agents in the biggest Army Hospital (380 bedded) situated in Kathmandu which serves people from all over the country. I feel literature is lacking on this aspect in Nepal.

Materials and Methods

This study was carried out in Birendra Hospital, Chhauni. All culture specimens along with their bacterial isolates (if positive) were noted from the registers of microbiology section from Baishakh 059 to Chaitra 059 B.S. (May 2003 to April 2003).

Culture of midstream sample voided in sterile bottle was done on 5% blood agar and MacConkey agar plate with inoculating loop of standard dimension. The culture plates were incubated overnight at 37°C. Samples showing 10⁵ or more organism per ml of uncentrifuged urine were taken as significant. Identification of significant isolates were done by using standard microbiological techniques.

For collection of blood samples standard aseptic techniques were followed. In 10 ml broth 2 ml of blood was poured at the bedside with aseptic precautions and were incubated at 37°C. Incubation was continued in seven days unless the visible growth was obtained earlier. The subculture of positive culture was done on blood agar and MacConkey agar from those broth which showed organism. The MacConkey and blood agar plates were incubated at 37°C for 24 hours. Identification of bacteria from positive culture plates was done with the use of standard microbiological techniques which included colony morphology, staining reactions and biochemical properties.

Similarly respective standard techniques were followed for other specimens in collection, processing and inoculation. After appropriate time of incubation, the culture plates were observed for significant growth of the organism.

Results

| Types of specimen | No | Percentage |
|-------------------|-------------|------------|
| Blood Culture | 6250 | 66.62 |
| Nonblood Culture | 3180 | 33.72 |
| Total | 9430 | 100 |

This table shows that blood culture sample was the commonest sample (66.5%) and there were total of 9430 culture specimens received in one year.

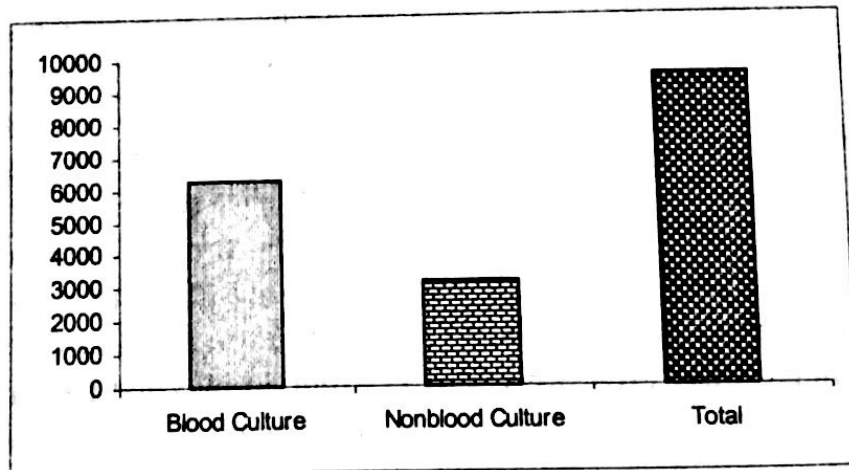


Table - 2

Types of Blood Culture Samples and Culture Positivity

| | No. of Samples | Percentage | Positive No | Positive Percentage |
|----------------------------------|----------------|------------|-------------|---------------------|
| Blood Culture for Salmonella | 6240 | 99.8 | 1009 | 16.14 |
| Blood Culture for non Salmonella | 10 | 0.02 | 0 | 0 |
| Total Samples | 6250 | 100 | 1009 | 16.14 |

There was almost always demand of culture for salmonella organism amongst samples received for blood culture. Among 6240 samples of culture, 16.14 % were found to be positive.

Table - 3

Enteric Fever in Different Groups of People

| | Total No of Samples | No of Positive Samples | Percent | Chi ² P Value |
|--------------|---------------------|------------------------|---------|--------------------------|
| Officers | 151 | 10 | 6.6 | |
| Non officers | 2283 | 549 | 24.0 | 0.000 |
| Families | 3816 | 480 | 12.6 | |
| Total | 6250 | 1009 | | |

The table C depicts that non-officer and families have almost equal number of infection with enteric fever.

Table - 4

Types of Microbiological Samples other than Blood

| Types | No. of Samples | Percentage of Non-Blood | No of Positive Samples | Percentage |
|----------------------------------|----------------|-------------------------|------------------------|--------------|
| Urine | 1759 | 55.31 | 470 | 26.71 |
| Pus | 702 | 22.0 | 373 | 53.13 |
| Sputum | 227 | 7.1 | 76 | 33.48 |
| Throat Swab | 183 | 5.75 | 14 | 7.6 |
| Fluid | 111 | 3.4 | 1 | 0.9 |
| Stool | 60 | 1.8 | 0 | 0 |
| Drain Swab/ET Tube/ Cannula tips | 39 | 1.0 | 3 | 7.6 |
| CSF | 34 | 1.0 | 1 | 2.9 |
| AFB Culture | 28 | 0.88 | 2 | 7.1 |
| FNAC aspiration | 22 | 0.69 | 0 | 0 |
| Fungal Culture | 10 | 0.31 | 0 | 0 |
| High vag. swab | 4 | 0.12 | 1 | 25 |
| Bronchoalvcolar lavage | 1 | 0.13 | 0 | 0 |
| Total | 3180 | 100 | 941 | 29.88 |

As per this table first three common samples were found to be urine, pus and sputum beside blood culture and constitute 55.31%, 22.0% and 7.1% respectively. The least common culture sample was broncho-alveolar lavage (0.3%). Maximum culture positivity was seen in pus culture (53%) followed by sputum (33.48%) and urine(26.7%).

Table - 5
Types of Organisms in Pus Culture

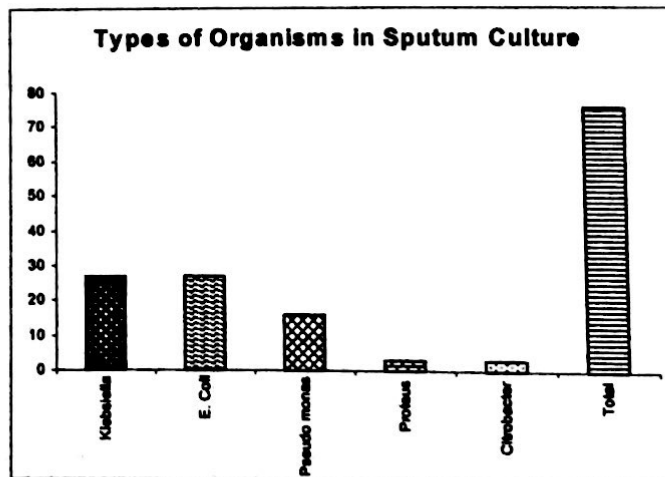
| Name of Organism | No. of Positive Samples | Percentage |
|---------------------|-------------------------|------------|
| Staph. aureus | 247 | 66.2 |
| E. Coli | 57 | 15.3 |
| Pseudomonas | 48 | 12.9 |
| Proteus | 12 | 3.2 |
| Citrobacter | 4 | 1.0 |
| Klebsiella | 3 | 0.8 |
| Providencia Species | 1 | 0.3 |
| Streptococcus | 1 | 0.3 |
| Total | 373 | 100 |

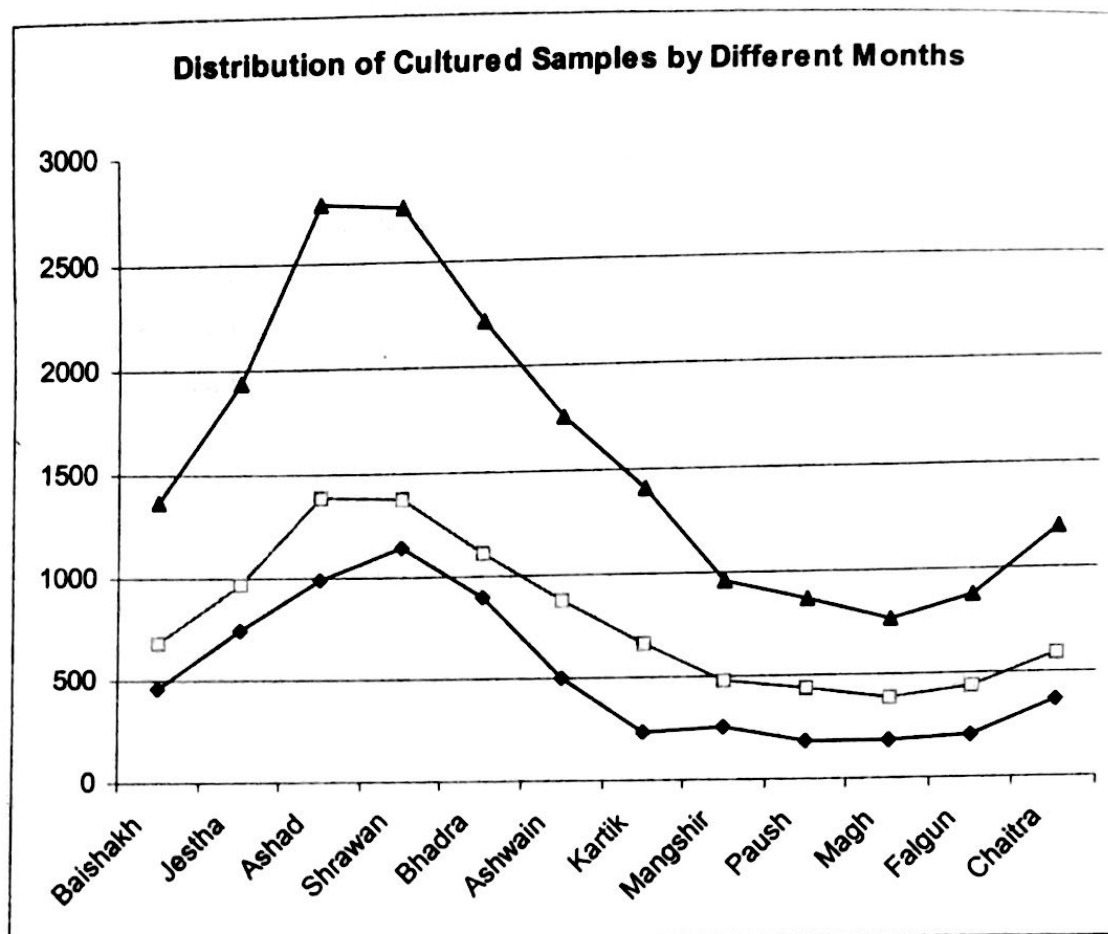
It depicts that Staph. aureus and E.coli are the first two common organisms 66.2% and 15.3% respectively in pus culture.

Table - 6
Types of Organism in Sputum Culture

| Name of Organism | No. of Positive Samples | Percentage |
|------------------|-------------------------|------------|
| Klebsiella | 27 | 35.5 |
| E. Coli | 27 | 35.5 |
| Pseudomonas | 16 | 21 |
| Proteus | 3 | 4 |
| Citrobacter | 3 | 4 |
| Total | 76 | 100 |

The table 6 shows that common isolates in sputum culture were klebsiella and E.coli 35.5% each and least common isolates were proteus species and citrobacter 4%each.



Graph - 7

This Graph -7 shows increased blood culture sample demand in months of Ashad, Shrawan and Bhadra where as non-blood culture samples were more or less same.

Discussion

Infection has been one of the commonest causes of disease and death particularly in children¹. It differs from other disease in few aspects like it is caused by a living micro-organism; it is communicable and most infections are potentially curable. Hence, culture specimens are one of the commonest investigation in microbiology department of any hospitals to find out aetiological agent of infection.

The results showed a total of 9430 culture samples in one year (2059 B.S.) with blood culture being the most demanded test (66.2%). The result of blood culture showed 16.14% growth positivity which is slightly higher than the study carried out by Rai et.al. in TUTH (15.31%)². Their study showed *Staph. aureus* (33.33%) being the commonest organism followed by *Kleb. pneumoniae* and *S.typhi* and *S.paratyphi*, whereas this study showed salmonella species as the only organism isolated in blood culture. Another study carried out in TUTH by Banjade NR, and Pokheral BM³ showed staph aureus and salmonella typhi were commonest isolates 42.10% and 38.59% respectively. So these findings were different as far as bacteriological isolates were concerned and hence prevalence of enteric fever is highest in our hospital.

Amongst nonblood samples, urine culture was the commonest specimen for investigation (55.31%) followed by pus (22%) and stool (7.2%). In urine culture, E.coli was the commonest isolate 79.5% and citrobacter and *Morganella morganii* were the least common pathogens. The higher prevalence of E.coli seen was similar to many other studies done by various other workers. Rai et.al.² showed 61.79% whereas Kulkarni et.al. (1986)⁴ in India showed E.coli as the principle isolate in urine.

The microbiology of pus samples showed *Staph aureus* (66.2%) as the principle pathogen followed by E.coli (15.3%). This finding was similar to findings of Rai C et.al. and Parajuli K³. In the case of sputum sample, only 7.1% showed significant growth of organisms and principle organism were *Klebsilla* species 35.5% and E.coli. Rai et.al. showed growth of 38.83%, Shrestha⁶ showed 40% and Woodhead⁷ 25%. The study of Rai et.al. showed *Kleb. pneumoniae* (25%) followed by *H. influenzae* and *Ps. aeruginosa* (17.5%) each and E.coli (15%). In contrary to our study, Shrestha⁶ in 1995 isolated *H. influenzae* (39.3%) followed by *Kleb. pneumonia* (15.5%).

In 1993, the study carried out by Macfarland et.al.⁸ found that out of 206 adults patients *Strepto. pneumoniae* 30% was the commonest isolates followed by *H. influenzae* 8%. Similarly study carried out by Buccheri⁹ in Italy in 1983 - 1984 in LRTI

showed that *S. pneumoniae* and *H. influenzae* were common. Our results did not correlate with the above mentioned researchers probably because of different treatment modalities, geographical variations and economic status.

This study also showed that blood culture specimens were more demanded in the month of Ashad, Shrawan and Bhadra probably as it coincides with rainy season and there is an increase in the fly population¹¹. The result also depicts that non-officers, families and officers have 24%, 12.57% and 6.6% positivity for enteric fever. These figures are statistically significant. Non-officers have higher rate because of poor hygiene, lower living standards, living in groups in barracks and they have to travel in different places frequently. Here, the positive cases in families are low, though they are about five times more in number than the regular army people. This is probably because all do not report to army hospital and they are more hygienic than their fellow men.

Conclusion

It is concluded that average culture specimen is 26 per day in a referral Army hospital situated in Kathmandu. Amongst total samples of 9430, positive growth was seen in 20.67%. Amongst the culture samples blood culture for salmonella was commonest (66.6%) in which 16.14% were found to be positive. The figure shows that non-officers are positive for enteric fever in 24% of cases. This shows that we should

upgrade their hygiene and living standards, drinking water supply and sanitation in the future to control their enteric fever problem. In a developing country like Nepal, culture specimen helps a lot to the clinician for treatment by giving a definitive diagnosis.

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