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ORIGINAL ARTICLE

Evaluation of Various Microbial Infections among Patients at a Tertiary Care Hospital

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ABSTRACT

Introduction: The present study was conducted for evaluating spectrum of microbial infections among subjects reported to department of medicine. **Methods:** Swab samples were obtained from all the patients and were sent for culture analysis. Spectrum of microbial infections was obtained after culture analysis reports. All the results were recorded and analysed by SPSS software. **Results:** In the present study, a total of 270 patients with presence of microbial infections were analysed. Among these patients, Escherichia coli, Staphylococcus aureus, Klebsiella pneumonia, Streptococcus pneumonia, Enterococcus spp., Pseudomonas aeruginosa, Candida spp. and Salmonella typhi infections were seen in 22.61 percent, 17.20 percent, 16.41 percent, 14.49 percent, 11.80 percent, 8.70 percent, 7.11 percent and 5.60 percent of the patients respectively. **Conclusions:** Escherichia coli and Staphylococcus aureus were the most frequently encountered microbial infections in the present study.

Keywords: Microbial Infections, Laboratory tests, disease prevalence

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Introduction:

Laboratory tests are performed and therapy is subsequently modified based on microbial results and the clinical course. However, accurate initial empiric therapy depends on understanding of local disease prevalence and susceptibility patterns. Disease prevalence information can identify both similarities and differences in microbial etiologies of clinical syndromes when compared with other regions. The modifications to the initial empiric therapy depend heavily on timely and accurate microbial data. When laboratory diagnoses are not available, clinical decision making is based on knowledge or assumptions regarding prevalent pathogens.[1-3] Microbial threats to health are microbes that lead to disease in humans. The challenges posed by microbial threats to health are daunting. Most developing nations have not shared fully in the public health and technological advances that have aided in the fight against infectious disease in the developing countries a fight that some had hoped would come close to eliminating these threats in these countries.[4-6] Hence; the present study was conducted for evaluating spectrum of microbial infections among subjects reported to department of medicine.

The infections are monitored closely by agencies such as the National Healthcare Safety Network (NHSN) of the Center for Disease Control and Prevention (CDC).[7] This surveillance is done to prevent HAI and improve patient safety. HAI infections include central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), surgical site infections (SSI), Hospital-acquired Pneumonia (HAP), Ventilator-associated Pneumonia (VAP), and *Clostridium difficile* infections (CDI).[8]

For the last few decades, hospitals have taken the hospital-acquired infections seriously. Several hospitals have established infection tracking and surveillance systems in place, along with robust prevention strategies to reduce the rate of hospital-acquired infections.[8] The impact of hospital-acquired infections is seen not just at an individual patient level, but also at the community level as they have been linked to multidrug-resistant infections. Identifying patients with risk factors for hospital-acquired infections and multidrug-resistant infections is very important in the prevention and minimization of these infections.

Based on the guidelines from both the Infectious Disease Society of America (IDSA) and the American Thoracic Society (ATS), the definitions of Pneumonia have been changed to better identify patients at risk for multidrug-resistant (MDR) pathogens. This, in turn, is aimed at avoiding the overuse of antibiotics. Healthcare-acquired Pneumonia or HCAP, which was widely used previously, has been made obsolete.

Materials & methods:

A total of 270 patients were enrolled in the present study. Only those patients were included in which confirmed diagnosis of microbial infection was enrolled. Swab samples were obtained from all the

patients and were sent for culture analysis. Spectrum of microbial infections was obtained after culture analysis reports. All the results were recorded and analyzed by SPSS software.

Results:

In the present study, a total of 270 patients with presence of microbial infections were analysed. Among these patients, Escherichia coli, Staphylococcus aureus, Klebsiella pneumonia, Streptococcus pneumonia, Enterococcus spp., Pseudomonas aeruginosa, Candida spp. and Salmonella typhi infections were seen in 22.61 percent, 17.20 percent, 16.41 percent, 14.49 percent, 11.80 percent, 8.70 percent, 7.11 percent and 5.60 percent of the patients respectively.

Table 1: Spectrum of microbial infections

Microbial infection	Percentage
Escherichia coli	22.61
Staphylococcus aureus	17.20
Klebsiella pneumonia	16.41
Streptococcus pneumonia	14.49
Enterococcus spp.	11.80
Pseudomonas aeruginosa	8.70
Candida spp.	7.11
Salmonella typhi	5.60
Others	4.81
Total	100

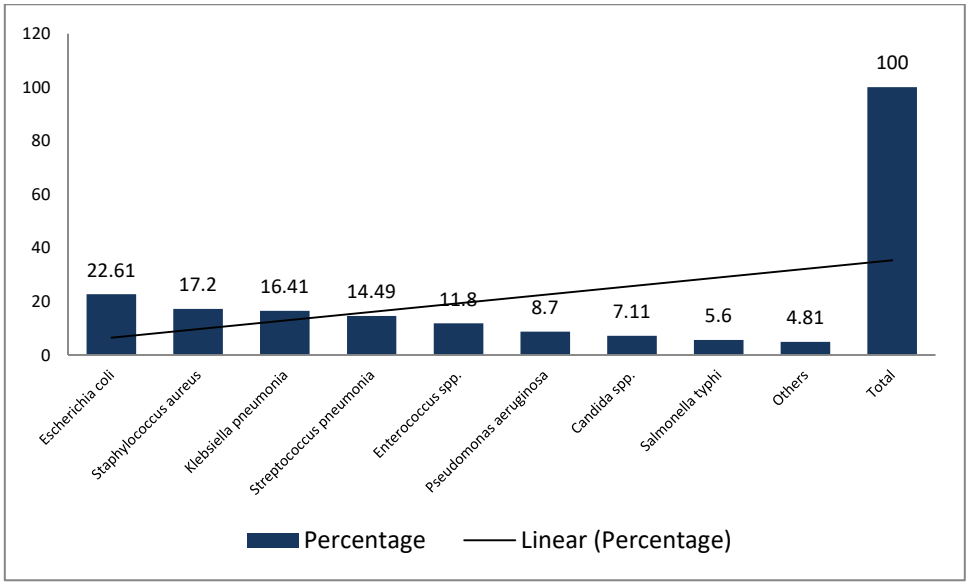

Figure 1: Spectrum of microbial infections

Among these 270 patients, 148 were males while the remaining 122 were females. Among 148 male patients, Escherichia coli, Staphylococcus aureus, Klebsiella pneumonia, Streptococcus pneumonia, Enterococcus spp., Pseudomonas aeruginosa, Candida spp. and Salmonella typhi infections were seen in 22.80 percent, 16.41 percent, 15.72 percent, 14.31 percent, 11.50 percent, 10.11 percent, 6.61 percent and 5.60 percent of the patients respectively. Among 122 female patients, Escherichia coli, Staphylococcus aureus, Klebsiella pneumonia, Streptococcus pneumonia, Enterococcus spp., Pseudomonas aeruginosa, Candida spp. and Salmonella typhi infections were seen in 22.30 percent, 18.03 percent, 17.21 percent, 14.60 percent, 12.10 percent, 6.90 percent, 7.81 percent and 5.271percent of the patients respectively.

Table 2: Gender-wise distribution and spectrum of microbial infections

Microbial infection	Male	Female	Total
	Percentage	Percentage	Percentage
Escherichia coli	22.80	22.30	22.60
Staphylococcus aureus	16.41	18.03	17.20
Klebsiella pneumonia	15.72	17.21	16.40
Streptococcus pneumonia	14.31	14.60	14.50
Enterococcus spp.	11.50	12.10	11.80
Pseudomonas aeruginosa	10.11	6.90	8.70
Candida spp.	6.61	7.81	7.11
Salmonella typhi	5.60	5.21	5.60
Others	5.21	4.40	4.81
Total	100	100	100

Discussion:

This measure describes the occurrence of a pathogen in a population and is an essential component of mathematical models in epidemiology. Because determining the "true" prevalence of a pathogen in a population would require exhaustive sampling from every individual in the target population, studies generally estimate pathogen prevalence by determining the infection status of a proportion of the population via necropsy or sampling of feces, urine, blood, or saliva. Because invasive procedures may be impractical or prohibited, particularly in studies of threatened populations, the analysis of noninvasive samples of material that potentially contains evidence of infection (e.g., feces or urine) is often preferred.[9-12] Hence; the present study was conducted for evaluating spectrum of microbial infections among subjects reported to department of medicine. In the present study, a total of 259 patients with presence of microbial infections were analysed. Among these patients, Escherichia coli, Staphylococcus aureus, Klebsiella pneumonia, Streptococcus pneumonia, Enterococcus spp., Pseudomonas aeruginosa, Candida spp. and Salmonella typhi infections were seen in 21.62 percent, 16.22 percent, 15.44 percent, 13.51 percent, 10.81 percent, 7.72 percent, 6.18 percent and 4.63 percent of the patients respectively. Among these 259 patients, 142 were males while the remaining 117 were females. Among 142 male patients, Escherichia coli, Staphylococcus aureus, Klebsiella pneumonia,Streptococcus pneumonia, Enterococcus spp., Pseudomonas aeruginosa, Candida spp. and Salmonella typhi infections were seen in 21.83 percent,

15.49 percent, 14.79 percent, 13.38 percent, 10.56 percent, 9.15 percent, 5.63 percent and 4.63 percent of the patients respectively. Maina D et al analyzed the spectrum of microbial agents and resistance patterns seen at a 300 bed tertiary private teaching hospital. For blood isolates, we used culture collection within the first three days of hospitalization as a surrogate for community onset, and within that group, Escherichia coli was the most common, followed by Staphylococcus aureus. In contrast, Candida spp. and Klebsiella pneumoniae were the most common hospital onset causes of bloodstream infection. Antimicrobial resistance rates for the most commonly isolated Gram-negative organisms were higher than many recent reports from Europe and North America. In contrast, Gram positive resistance rates were quite low, with 94% of S. aureus being susceptible to oxacillin and only rare isolates of vancomycin-resistant enterococci. Their study demonstrated high rates of antimicrobial resistance in Gram negative organisms, even in outpatients with urinary tract infections[10].In the present study, among 117 female patients, Escherichia coli, Staphylococcus aureus, Klebsiella pneumonia, Streptococcus pneumonia, Enterococcus spp., Pseudomonas aeruginosa, Candida spp. and Salmonella typhi infections were seen in 21.37 percent, 17.09 percent, 16.24 percent, 13.68 percent, 11.11 percent, 5.98 percent, 6.84 percent and 4.27 percent of the patients respectively. Amaku M et al proposed a method to approximately estimate the full prevalence (and any other variable or parameter related to transmission intensity) of infectious diseases. The model assumes incomplete notification of incidence and allows the estimation of the non-notified number of infections and it is illustrated by the case of hepatitis C in Brazil. The method has the advantage that it can be corrected iteratively by comparing its findings with empirical results.

Conclusion

Escherichia coli and Staphylococcus aureus were the most frequently encountered microbial infections in the present study.

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