A Study on Clinical Profile and Antimicrobial Drug Resistance in Infection with Stenotrophomonas maltophilia at a Tertiary Care Hospital of Rural Gujarat, India.

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Abstracts: Background & objectives: Stenotrophomonas maltophilia causes opportunistic infections and is emerging as an important hospital-acquired pathogen. Present study was undertaken to investigate the prevalence, clinical profile, associated factors and antimicrobial susceptibility of S. maltophilia. Methods: Cross sectional retrospective study was conducted whereby patients' details including type of infection, hospital stay, indwelling devices, co-morbid conditions and outcome till discharge were collected from January 2012 to March 2016. Identification and antimicrobial susceptibility were done by using Vitek2-compact-microbiological system. Results: 45 (0.17%) S.maltophilia strains were isolated from 27,132 samples received, forming 1.63% of total non-fermenters. Prevalence of S.maltophilia infection ranged from 0.06% in 2012 to 0.26% in 2015. Common sites involved were respiratory tract i.e. 55.5%, followed by bloodstream (20%), urinary tract (13.3%) and soft tissue (11.1%). 64.4% patients were male, and adults (26.7%) between 51-60 years of age. 66.7% of the isolates were from critical care units followed by wards (33.3%). Co-morbid conditions observed were COPD with respiratory complications i.e. 26.7% followed by cardiovascular diseases 22.2%, malignancy 11.1%, post surgical patients 11.1%, complicated UTI and trauma 8.8% each, CNS complications 6.7%, burns and cellulitis 2.2% each. All patients had exposure to broad-spectrum antibiotics and 66.6% had indwelling devices. 17.8% isolates were resistant to trimethoprim-sulfamethoxazole. Mortality observed was 20%. Interpretation & conclusion: S maltophilia is an emerging pathogen and its prevalence has gradually increased at our hospital. ICUs are the main hospital sites and respiratory infections main clinical condition. [Disha S NJIRM 2016; 7(5):5-8]

Key-Words: Stenotrophomonas maltophilia, Prevalence, Antimicrobial drug resistance

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Introduction: S. maltophilia is ubiquitous, aerobic, gram negative, non-fermentative bacterium and can be recovered from almost any clinical site. It occasionally causes opportunistic infections including pneumonia, septicaemia, catheter associated infections, endocarditis, urinary tract infections, soft tissue infection, meningitis, cholangitis, and is emerging as an important hospital-acquired pathogen.[1] Nosocomial sources of S. maltophilia have been reported from the hands of health care workers, disinfectant solutions, ventilation tubing, nebulizers and inhalation systems, moistening water reservoirs and blood sampling tubes.[2] Several risk factors have been identified with S. maltophilia infection including underlying malignancy, cystic fibrosis, corticosteroids or immunosuppressant therapy, the presence of an indwelling central venous catheter and exposure to broad spectrum antibiotics.[3] The natural resistance to imipenem and high resistance to commonly used antimicrobial agents leave few antimicrobials as an option, making treatment of patient infected with S. maltophilia very difficult.[4] Recently S. maltophilia was classified as one of the leading multidrug resistant organism by the World Health Organization.[5]

Only trimethoprim/sulfamethoxazole is recommended for the treatment of infected patients, but some circumstances e.g. hypersensitivity of the patient and resistance can limit the use of this drug. In such cases, susceptibility for other antimicrobials must be tested, even if clinical evidences for their efficacy are lacking.[6] Increasing numbers of patients at risk, the necessity of the usage of broad-spectrum antibiotics and the natural features of this bacterium such as its ability to colonize and survive on humid surface, to form a biofilm, and resistance to number of antimicrobial agents together mean that S. maltophilia is a continuous threat.[3, 4, 7] The high attributable mortality rates and poor outcome reported in S. maltophilia infection makes the spread of this bacterium even more worrisome. The emergence of new resistance mechanisms in S. maltophilia requires substantial monitoring and reporting of antibiotic susceptibility of clinical isolates.[7] The present study was undertaken to investigate the prevalence, clinical profile of the

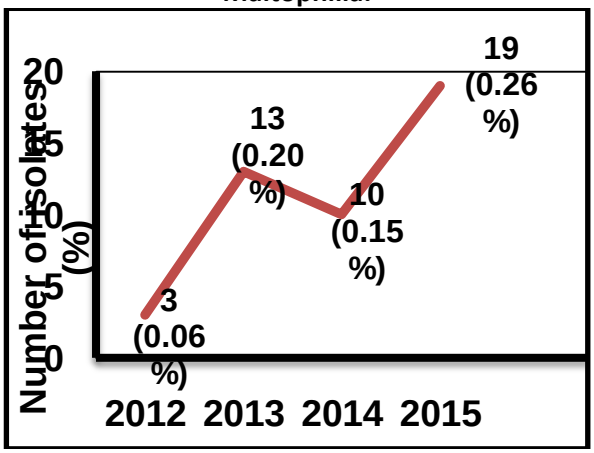
patients infected, associated factors and antimicrobial susceptibility pattern of S. maltophilia, an emerging multi-drug resistant opportunistic pathogen in hospital located in rural Gujarat.

Methods: This cross sectional retrospective study was conducted in a 610 beds tertiary care hospital from January 2012 to March 2016 after the approval of the Institutional Ethics Committee (IEC). S. maltophilia isolated from various clinical specimens submitted for bacteriological cultures from admitted patients of all age groups and both sexes were included in the study. Isolates of S. maltophilia were excluded if found to be contaminant after the clinical and microbiological review. Demographic and clinical data of each patient were collected in terms of type of infection, hospital-stay, indwelling devices, co-morbid conditions and outcome till discharge in a predesigned proforma. The specimens collected were sputum, endotracheal secretion, bronco alveolar lawage, ascitic fluid, pus, urine, blood, CVP tip, urinary catheter tip, drain, etc. Samples were processed as per the standard microbiological techniques. The identification of the isolates and minimum inhibitory concentration (MIC) of the levofloxacin and trimethoprim/sulfamethoxazole was done with Vitek2-compact fully automated microbiological system (bio Meriux, France) by using Enterobacteriaceae-GN and AST-N281 cards respectively. The results of antimicrobial susceptibility were interpreted according to the clinical laboratory standards institute guidelines (CLSI).[8] Data collected was analyzed using descriptive statistics.

Result: During the study period a total 27,132 samples were received for culture and antimicrobial susceptibility test with isolation of 45 (0.17%) strains of S.maltophilia from various non-duplicate clinical specimens, forming 1.63% of total non-fermenters [Figure 1]. The prevalence of S.maltophilia infection was 0.06%, 0.20%, 0.15% and 0.26% in the years 2012, 2013, 2014 and 2015 respectively demonstrating a gradual rise of 0.20% over three years. S.maltophilia was not isolated in the year 2016 till March [Graph 1]. The analysis of clinical background of 45 isolates revealed that maximum isolates of S.maltophilia i.e. 25/45 (55.5%) were from respiratory tract, followed by bloodstream 9/45 (20%), urinary tract 06/45 (13.3%) and soft tissue 05/45 (11.1%). Majority of the isolates i.e. 30 (66.7%) were from critical care units (35.6% in SICU and 31.1% in MICU) followed by various wards i.e. 15 (33.3%). Majority of patients were male, 29 (64.4%) and adults between 51-60 years of age i.e. 12 (26.7%). Hospital stay of the patients with S.maltophilia infection was ranging from 3-115 days with the average of 26 days. The co-morbid conditions or risk factors associated with S.maltophilia infection observed were COPD with respiratory complications i.e. 26.7% followed by cardiovascular diseases 22.2%, solid organ malignancy 11.1%, post surgical patients 11.1%, complicated UTI and trauma 8.8% each, central nervous system complications 6.7%, burns and cellulitis 2.2% each. All patients had exposure to broad-spectrum antibiotics and 66.6% had indwelling catheters. Antimicrobial resistance to trimethoprim-sulfamethoxazole and levofloxacin was 17.8% (8 out of 45) and 28.9% (13 out of 45) respectively. Overall mortality in patients as 9 (20%). Six (13.3%) patients were discharged against medical advice while clinical improvement was seen in 30 (66.7%).

Figure- 1: Showing growth of S.maltophilia on 5% sheep blood agar plate.

Graph-1: Showing year wise prevalence of S. Maltophilia.



Discussion: S. maltophilia is a widespread environmental organism found in water, soil and on

plants that has become an opportunistic pathogen of increasing importance for hospitalized patients and in community settings, especially among immunocompromised hosts.[3] In our study, the prevalence of S.maltophilia infection has ranged from 0.06% in 2012 to 0.26% in 2015 demonstrating a gradual rise of 0.20% over three years with an average isolation rate of 0.17%, Ya-Ting Chang et.al. reported in their review article, prevalence of S. maltophilia in worldwide surveillance and multicentre study that infection in general population increased from 0.8-1.4% during 1997-2003 to 1.3-1.68% during 2007-2012.[3] S.maltophilia is known to cause respiratory tract infections and bacteremia more commonly.[9] We found maximum isolates from respiratory tract (55.5%), followed by bloodstream (20%), urinary tract (13.3%) and soft tissue (11.1%). This is similar to findings by Gozel et.al. (2015), who reported respiratory tract infections in 50.7% cases followed by blood stream infection in 49.3%.[10] A study by Wang et.al. (2014) has also found respiratory tract i.e. 56% followed by soft tissue 19%, urinary tract 9%, blood stream 6% infection caused by S.maltophilia.[9] In our study, the prevalence of infections due to S.maltophilia was higher in intensive care units (66.7%) followed by various wards (33.3%). Juhasz et.al. (2014) and Gozel et.al. (2015) also found 70% & 52% isolates of S.maltophilia from patients admitted to various intensive care units respectively.[10, 11] In our study majority of patients were male (64.4%) and adults between 51-60 years of age (26.7%). This is similar to findings by Juhasz et.al. (2014), who has reported 58% male with median age of 64 years.[11] Wei Jia et.al. (2015) has also found 55.9% of their patients aged over 60, suggesting that elderly patients are at high risk of S.maltophilia infection.[12] Prolonged hospitalization, stay in intensive care units, mechanical ventilation are well known risk factors for acquiring nosocomial infections particularly S.maltophilia.[10] In our study hospital stay of the patients was ranging from 3-115 days while Ji Hyeon Baek et.al. (2014) has reported a range from 37.5-93.5 days.[13] In current study most common underlying co-morbid conditions were COPD in 26.7% followed by cardiovascular diseases (22.2%), solid organ malignancy (11.1%), post surgical patients (11.1%), complicated UTI and trauma 8.8% each, central nervous system complications 6.7%, burns and cellulitis 2.2% each. Wang et.al. (2014) has reported various co-morbid conditions like major surgery (43%), solid organ malignancy (39%), coronary artery disease (38%), diabetes mellitus (36%), chronic kidney disease (26%), pulmonary disease (26%), congestive heart failure (25%), liver disease (9%) and haematological malignancy (4%).[9]

In a worldwide study of the antimicrobial susceptibilities of clinical isolates of S. maltophilia, trimethoprim/sulfamethoxazole and levofloxacin showed resistance of 4% and 16.6% respectively.[14] Resistance rates of less than 10% have been reported for trimethoprim/sulfamethoxazole but we found it to be 17.8%.[15] Resistance to levofloxacin was 28.9% in our study which is comparable with 20% resistance reported by Chung H et.al. Overall mortality in patients infected with S.maltophilia, was 20% in our study. Juhasz et.al. (2014) has reported all cause mortality of 45% in their study, which is quite alarming. [11]

Conclusion: S maltophilia is an emerging pathogen in health care facilities and over a period of three years, its prevalence has shown gradual increase at our hospital. Majority of the patients infected with S. maltophilia were critically ill and admitted in intensive care units. The most common clinical specimens from which S. maltophilia was isolated were respiratory tract secretions and blood. The factors associated with infection in our study were COPD, cardiovascular diseases, underlying malignancy. Resistance to trimethoprim-sulfamethoxazole is an alarming. An active infection control programme, with periodic surveillance of infection by these strains, can effectively prevent the spread of these nosocomial pathogens to improve patient safety.

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