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RESEARCH ARTICLE

A Retrospective Study of Microbial Profile of Head Injury and Stroke Patient Admitted in EMCH, Savar, Dhaka, Bangladesh

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ABSTRACT

Introduction: Many head injury patients have reduced consciousness, are prone to aspiration of oral secretions, and likely develop pneumonia. Respiratory tract infection (RTI), especially pneumonia, is a very common disease in Neurosurgical Intensive Care Units (NSICU).

Objective: To evaluate the microbial profile of head injury and stroke patients admitted to EMCH, Savar, Dhaka, Bangladesh.

Methods: It was a retrospective study conducted at Enam Medical College & Hospital, Savar, Bangladesh, from 2017 to 2021. A total of 46 patients admitted with a head injury and stroke patient were enrolled in this study. Data were collected using a structured questionnaire containing all the variables of interest. Data were processed and analyzed with the help of the computer program SPSS for windows version 25.

Results: This study shows 84.8% males and 15.2% females. The mean age was 42.54±18.09 years. Pathogens found in culture samples were tracheal aspirate C/S (54.3%), urine C/S (26.1%), catheter tip C/S (13%), and the tip of the ET tube C/S (4.3%). The main attributed pathogens were staph. aureus (47.8%), Klebsiella spp (37%), E. coli (32.6%), streptococcus (2.2%), acinetobacter SPP (2.2%) and pseudomonas SPP (2.2%).

Conclusion: This study shows staph. Aureus, Klebsiella spp, and E. coli are the most common pathogen isolated. Therefore, careful microbial profile and antibiotic susceptibility testing are necessary for the prevention of pathogens as well as an effective treatment.

KEYWORDS: Microbial Profile, Head Injury, Stroke Patient, Bangladesh.

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INTRODUCTION

Many head injury patients have reduced consciousness, are prone to aspiration of oral secretions, and are likely to develop pneumonia.1 Respiratory tract infection (RTI), especially pneumonia, is a very common disease in Neurosurgical Intensive Care Units (NSICU). Clinically, the trachea, main bronchus, and bronchioles at various levels in the lung are uniformly called lower respiratory tract (LRT), having the ability to eliminate microbes and purify inhaled gas. Risk factors included dysphagia, impaired consciousness, and ineffective cough reflex, as they impaired the ability of the LRT to eliminate microbes from oropharyngeal contents and so allow pathogens to enter the lung.2,3 Diverse communities of pulmonary microbes have been discovered. Thus dysbiosis was considered related to impaired pulmonary defenses.4 Besides, the alternation of oral microbial diversity was not only observed in the murine pneumonia model but also among the patient population of post-stroke and ventilation-associated pneumonia (VAP), inspiring new directions to investigate pathogenesis.5 In recent studies,

elevated bronchoalveolar lavage (BAL) amylase levels were associated with a high risk of aspiration and positive culture, while serum procalcitonin (PCT) was associated with a prognosis of aspiration pneumonia (AP).3 However, the diagnosis of pneumonia still relies on clinical features, such as the lack of standard gold biomarkers. According to the current epidemiology of VAP, Staphylococcus aureus (S. aureus), Klebsiella pneumoniae (K. pneumoniae), Pseudomonas aeruginosa (P. aeruginosa), Escherichia coli (E. coli), Streptococcus pneumoniae (S. pneumoniae), and Haemophilus influenzae (H. influenzae) are considered as major pathogens, which is of high similarity to the microbiology of hospital-acquired pneumonia (HAP) or community-acquired pneumonia (CAP).6 Clinically, it is common to apply mechanical ventilation (MV) on critically ill patients to maintain normal gas exchange. However, the mechanical force from MV could damage the normal airway barrier and the ability of the LRT to eliminate microbes. MV is a risk factor for VAP, and critically ill patients with MV are the population with a high risk of developing VAP. Besides, prophylactic antibiotic treatment (PAT) has different effects in decreasing morbidity and mortality owing to distinctive subtypes of pneumonia as well as the patient population.7 The choice of antibiotics remains controversial. In summary, investigating the microbiology of pneumonia in critically ill patients with MV is of high significance.3 This study conducted a retrospective study to identify the microbial profile of head injury and stroke patients admitted in EMCH, Savar, Dhaka, Bangladesh.

MATERIALS AND METHODS

A retrospective study was conducted at Enam Medical College & Hospital, Savar, Bangladesh, from 2017 to 2021. A total of 46 patients admitted with a head injury and stroke were enrolled in this study. Data were collected using a structured questionnaire containing all the variables of interest. Data were processed and analyzed with the help of the computer program SPSS for windows version 25.

RESULTS

Table 1: Age distribution of the study subject (n=46)

Age in years	Frequency	Percentage (%)	Mean±SD
≤15	2	4.3	42.54±18.09
16-25	7	15.2	
26-35	8	17.4	
36-45	7	15.2	
46-55	9	19.6	
>55	13	28.3	

Table 2: Sex distribution of the study subject (n=46)

Sex	Frequency	Percentage (%)
Male	39	84.8
Female	7	15.2

Table 3: Diagnosis distribution of the study subject (n=46)

Diagnosis	Frequency	Percentage (%)
Post traumatic bifrontal contusion	11	23.9
Head injury with SDH	8	17.4
Diffuse Brain edema due to RTA	7	15.2
Spontaneous ICH	5	10.9
SAH due to rupture aneurysm	4	8.7
Ischemic stroke	4	8.7
Pneumocephalus	4	8.7
Severe DAI	4	8.7
Hemorrhagic Stroke with Pan ventricular Extension	3	6.5
Rt Fronto- temporo-Parietal SDH with Rt Orbital & Maxilla fracture	3	6.5
RTA with aspiration pneumonia	2	4.3
Bulbar palsy	1	2.2
Meningoencephalitis	3	6.5
Thalamo ganglionic Hg (lft)	3	6.5
Head Injury with AKI	2	4.3
Traumatic Brain Injury with CKD	2	4.3
Severe Traumatic Brain Injury with Multiple Ribs Fracture	2	4.3
Obstructive Hydrocephalus due to Ventricular Hg	1	2.2
Hospital Accquired Pneumonia (HAP)	1	2.2
Hypertensive Encephalopathy With CKD	1	2.2
Convulsion Under Evaluation With HTN	2	4.4
Cerebellar Infarction (rt)	1	2.2
Split Brain Syndrome due to RTA	1	2.2
Ventriculomegally With Lt Clavicle Fracture	1	2.2
Aphasia due to TBI	1	2.2

Table 4: Positive findings of the study subject (n=46)

Positive findings	Frequency	Percentage (%)
Tracheal aspirate C/S	25	54.3
Urine C/S	12	26.1
Catheter tip C/S	6	13.0
Tip of ET Tube C/S	2	4.3
CV line tip C/S	2	4.3
Blood C/S	2	4.3
Nasal Swab	2	4.3
Sputum C/S	2	4.4
Aspirate C/S	2	4.4
Aural swab	1	2.2
Wound swab C/S	1	2.2

Table 5: Type of organism of the study subject (n=46)

Type of organism	Frequency	Percentage (%)
Staph. aureus	22	47.8
Klebsiella spp	17	37.0
E. Coli	15	32.6
Streptococcus	1	2.2
Acinobacter spp	1	2.2
Pseudomonas spp	1	2.2

DISCUSSION

This study shows 84.8% males and 15.2% females. The age ranged from 5-to 70 years. The mean age was 42.54±18.09 years. Nine subjects (19.5%) were under the age of 25 years, 24 (52.2%) were in the age group of 26-55 years, while 13 (28.3%) were more than 55 years. In a similar study, Chandran et al.8 reported there were 75.5% males and 24.5% females. The mean age was 47.9 years, and the median age was 47 years. Eight subjects (7.5%) were under the age of 25 years, 52 (49%) were in the age group of 25-50 years, while 46 (43.5%) were more than 50 years old. This study shows pathogens found in culture samples of head injury and stroke patients were tracheal aspirate C/S (54.3%), urine C/S (26.1%), catheter tip C/S (13%), ET tube C/S (4.3%) which consistent with other studies.1 In this study, the main attributed pathogens were staph aureus (47.8%), Klebsiella spp (37%), E.coli (32.6%), streptococcus (2.2%), Acinetobacter spp (2.2%) and Pseudomonas spp (2.2%). In a similar study, Chandran et al. reported microbiology of respiratory infections was similar to that of overall infection; Acinetobacter (37.8%), Klebsiella (26.8%), and Pseudomonas (17.0%); were chief offenders. Cultures of urine were positive for Candida (25.8%), E.coli (16.0%) and Enterococci (16.0%). Wound sites tested positive for Acinetobacter as a leading pathogen (46.6%), followed by mixed bacterial growth (40%). Meningitis was caused mainly by Acinetobacter and Klebsiella (28.5% each). Blood cultures showed Methicillin-resistant staphylococcus aureus (MRSA) and Acinetobacter as chief transgressors, causing 30.7% of BSIs. In another study by Zhao et al.3, the main pathogens attributed to K. pneumoniae (40%), S. aureus (25.9%), and H. influenzae A. Besides, a systemic review involving 7968 patients with acute stroke indicted that the commonly isolated organisms K. pneumoniae (12.8%), E. coli (9%), S. aureus (10.1%), P. aeruginosa (6%), A. baumanii (4.6%), and S. pneumoniae (3.5%).[9]

CONCLUSION

This study shows the main culture sample was Tracheal aspirate C/S, then urine C/S, catheter tip C/S, and Tip of ET tube C/S. The most common organism were staph aureus, Klebsiella spp, and E. coli. If we are encountering a respiratory tract infection in an intubated head injury and stroke patient, a potential culture sample which can be the empirical drug of choice till the final culture and sensitivity.

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AUTHORS' CONTRIBUTIONS

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript, and provided approval for this final revised version.

COMPETING INTERESTS

The authors declare no competing interests with this case.

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