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Bacterial Infection Associated with Respiratory Cystic Fibrosis in Al-Hilla City

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Abstract: *Back ground: Autosomal genetic diseases throughout North America are propagated by CF, which is seen in 1 out of 2000 Caucasians. This sickness can in most cases be undetected and is nongendered with a global impact and targets all ages. By the impaired mucocilliary clearance in the trachea and bronchi, and the inability to maintain innate defenses, acute and recurrent bacterial infections, airways obstruction and inflammation and chronic bacterial infections are aggravated. Aim of study: The study aims to isolate and identify bacterial species related to respiratory fibrosis and to do the susceptibility test to those species. Methodology: The study was carried out between January-July 2024, 80 cystic fibrosis patients admitted in Mirjan hospital, 50 came outpatients clinic and 30 found sleeping in the hospital (Eighteen in the respiratory lobbies and 12 in the intensive care unit (ICU)), patient age range between 20-80 years old, and include both gender, 28 females and 52 male.es). By using sterile labeled machines every patient provide sputum that was transported to laboratory directly after collection and stored in 4 C temperatures until culture. All samples of sputum were cultivated for twenty-four hours at 37 degrees Celsius in an incubator utilizing MAConkey and Blood agars. Thereafter, samples were streaked unto several selective and differential media where bacterial colonies matured to reveal their biochemical characteristic after 24hrs of incubation. Results: The current study's results indicated that age has an impact on microbial CF infection. Of the 80 total patients, 9 sample in the age group of 20–30 years had a percentage of 11.25%, while 11 patients in the age group of 31–40 years had a percentage of 13.75%, 16 patients in the age group of 41–50 years had a percentage of 16.25%, and 17 patients in the age group of 51–60 years had a percentage of 21.25%. The current study confirmed that infection rates increase with age. In terms of gender, the study show that males are more likely than females to get infections. with 52 males in the (65%) percentage and 28 females in the (35%), Ten patients are in the 71–80 age range, and twenty patients are in the 61–70 age group. Conclusion: The kind of bacterial strain, the patient's immunological condition, and the usage of contaminated medical equipments are some of the factors that affect transmission. During treatment, all CF patients colonized or infected with the primary pathogens discussed in this article must be kept in a single room to prevent nosocomial dissemination of the microorganism to other patients. Despite the intricacy of the epidemiology of bacterial infections in CF patients, the average lifespan of these individuals continues to increase.*

Keywords: *Cystic infection, Breathing, Respiratory*

1. INTRODUCTION

In addition to a persistent lung infection, the clinical illness known as cystic fibrosis (CF) also involves gastrointestinal, nutritional, and other issues. Mutations in the CFTR gene cause the well-known, severe monogenic recessive disease known as cystic fibrosis (CF), which is most commonly found in Caucasian individuals with European heritage. The most problematic clinical characteristic, chronic Pseudomonas aeruginosa lung infection, allows CF to be classed as an infectious illness even though the gene defect affects the patient's health in a variety of wayseighty to 95% of CF patient eventually die from respiratory failure caused by a persistent bacterial infection and related airway inflammation. Research efforts increased following the 1989 discovery of the genetic defect that causes CF, which improved knowledge of the molecular processes behind the disease's many phenotypic expressions (1). The extent

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of the association between persistent bacterial respiratory infections, especially those caused by P, and the CF gene product CFTR mutant forms. That is why Aeruginosa is still on the stray level where it is hard to point at it. Understanding this association is critical because this infection and resulting inflammation are primarily responsible for the morbidity and mortality associated with the disease. Among children with cystic fibrosis, S.aureus and H.influenzae invade or infect the lungs of the babies and young children. These microbes may degrade the epithelial surfaces, making it easier for P aerogenosa to attach and in time replace it (2). Nevertheless, sufficient clinical studies to assess the part these organisms had in the causation of lung sickness in CF individuals have not been released in the public domain(3). On the other hand, there is very limited data published in the peer reviewed literature indicating that S. aureus and nontypeable H. influenzae are pathogens that cause pulmonary disease in patients with CF. However, this role is largely suggested by clinical observations as evidenced by many clinician's practice. Pseudomonas aeruginosa is a known pathogen in people with CF and has been established to be directly related with lungs function decline and death among these patients. Continual P. (4). Decreases in pulmonary function and deteriorations in airway conductance are the effects of aeruginosa eroding epithelial surface of the patients' respiratory tracts and causing blockage of the airways. Senescent cell death is associated with major inflammation, neutrophil infiltration to the airways leading to obstruction that hampers the clearance of the senescent cells(4,6).

2. METHODOLOGY

Patients: The study was carried out between January-July 2024, concerns 80 CF arrived to Murjan hospital; attend the outpatient clinic 50 and 30 slept in the hospitals: 12 in RCU 18 in respiratory lobbies; ages of patients among present study were between 20-80 years; male/Female ratio 28/52.les).

Sampling: Cough sputum samples were obtained by asking all patients to cough into sterile container that was labeled and immediately taken to the laboratory after samples were collected and stored at 4 C pending culture.

Culture and Sensitivity Test : Each sputum sample was cultured and emplemented on MaConkey and Blood agar for a period of 24 hours at an incubation temperature of 37 C. Following the isolation of bacterial colonies utilizing selective and differential medium, biochemical assays were conducted 24 hours into the incubation period to determine the type of bacteria present. Following streaking, individual bacterial samples were subcultured on Muller-Hinton agar utilizing antibiotic discs, and the measurement of inhibition zones was carried out by hand to examine the bacterial response to medications (21).

3. RESULTS

The results of current study showed in below tables:

Table (1): Distribution of age among samples within study.

Age Group	No.	Percentage
20-30	9	11.25%
31-40	11	13,75%
41-50	13	16.25%
51-60	17	21.25%
61-70	20	25%
71-80	10	12.50%
Total	80	100.00%

Table(2): Sex Distribution among samples.

Gender	No.	%
Male	52	65%
Female	28	35%
Total	80	100%

Table (3): Distribution of Bacterial Species among samples.

Bacterial Spe.	No. among samples	Percentage
Mycobacterium sp.	17	21.25%
Staphylococcus aureus	14	17.50%
MRSA	13	16.25%
Pseudomonas aeruginosa	8	10%
Burkholderia ssp	7	8.75%
Achromobacter xylosoxidans	6	7.50%
Inquilinus limosus	3	3.75%
Ralstonia sp.	2	2.50%
Pandoraea apista	1	1.25%
Streptococcus pneumoniae	5	6.25%
Stenotrophomonos maltophilia	1	1.25%
Haemophilus influenzae	2	2.50%
Bordetella bronchiseptica	1	1.25%
Total	80	100.00%

Table(4): Antibiotics Sensitivity among isolated bacteria.

Bacterial Spe.	Amikacin	Tobramycin	Gentamicin	Piperacillin	Mezlocillin	Ticarcillin	Imipenem	Ciprofloxacin	Ceftazidime	Ceftriaxone	Cefotaxime	Aztreonam	Ticarcillin-clavulanate
Mycobacterium sp	88%	90%	63%	89%	72%	82%	88%	89%	85%	17%	22%	75%	92%
Staphylococcus aureus	80%	94%	69%	85%	70%	85%	79%	85%	77%	11%	24%	70%	96%
MRSA	83%	89%	74%	79%	69%	83%	83%	80%	73%	18%	19%	66%	90%
Pseudomonas aeruginosa	77%	94%	69%	85%	70%	85%	79%	85%	77%	11%	24%	70%	96%
Burkholderia ssp	67%	87%	66%	82%	77%	69%	70%	86%	55%	29%	33%	58%	87%
Achromobacter xylosoxidans	83%	89%	74%	79%	69%	83%	83%	80%	73%	18%	19%	66%	85%
Inquilinus limosus	79%	70%	58%	80%	77%	66%	77%	83%	76%	9%	3%	60%	84%
Ralstonia sp	82%	87%	66%	82%	77%	69%	70%	86%	55%	29%	33%	58%	88%
Pandoraea apista	69%	89%	74%	79%	69%	83%	83%	80%	73%	18%	19%	66%	85%
Streptococcus pneumoniae	90%	97%	69%	85%	70%	85%	79%	85%	77%	11%	24%	70%	93%
Stenotrophomonos maltophilia	92%	90%	69%	85%	72%	80%	79%	88%	77%	14%	20%	72%	93%
Haemophilus influenzae	88%	70%	58%	80%	77%	66%	77%	83%	76%	9%	3%	60%	84%
Bordetella bronchiseptica	67%	87%	66%	82%	77%	69%	70%	86%	55%	29%	33%	58%	88%

Discussion: However, the present study findings show that age influences the microbial CF infection of patients. Of the total 80 patients: Nine patients between the age of 20-30 year having 11.25%; 11 patients between the age of 31to 40 year having 13.75%; 16 patients between the age group of 41-50 years having 16.25%; and 17 patients between the age group of 51-60 years having 21.25%. There are 20 patients in 25% percentage in (61-70) age group current results similarly Atkinson et al.,2006 (15). Current study in gender index, indicated infection in males higher than those in females 52males in 65% while 28 females in 35%. Each with 8.75% of the samples, 6 samples of Achromobacter xylosoxidans, 7.5%, 3 samples Inquilinus limosus 3.75%, and 1 sample of Ralstonia sp. Of the total analysed samples, 1 samples of each of the following species: Streptococcus pneumonia in 6.25 %, Stenotrophomonos maltophilia in 1.25 %, and Haemophilus influenza in 2.5 % agreed with data from Stutts et al (19) although the reports for our 5 samples of Streptococcus pneumonia In 1.25%. These defenses include endocytic/phagocytic barriers as well as physical obstacles. Lung infections can occur in anybody who is deficient in one of these natural defenses. It is common for young CF patients to be unable to expectorate sputum that is generated by lower respiratory tract secretions before P forms. In instances of P. aeruginosa infection, oropharyngeal cultures—derived from the secretions of the upper respiratory tract—are commonly used to look for pathogens. In fact, these cultures are more likely to detect potentially harmful bacteria in the neck than in the lungs. However, a throat culture was negative despite S. aureus in the lower airways, and there was low negative predictive value, while for BAL cultures 46% of younger, nonexpectorating individuals had P. aeruginosa. Klebsiella spp identified with BAL fluid rather then oropharyngeal culture was at the same prevalence (21 %). Oropharyngeal cultures were less likely to have a high positive predictive value (69% for one, 83% for two) but higher negative predictive value (85% for one, 97% for two) to give positive microorganisms in the lower airway(8). Cultures of the oropharynx with negative P results. Rosenfeld et al regards that aeruginosa has a significantly lower PPV of 44% regarding the identification of the GRP in BAL for children aged less than five years, the NPV was remarkably high, at 95% for excluding the presence of this organism in the lower airway (9). In general, oropharyngeal cultures showed moderate sensitivity, but high specificity with a 41 % positive predictive value and a 97% negative predictivity for the CF pathogens S. aureus, P. aeruginosa and H. influenzae were noted by Armstrong et. al., who followed children with CF early diagnosed through a neonatal screening program. Rosenfeld et al regards that aeruginosa has a significantly lower PPV of 44% regarding the identification of the GRP in BAL for children aged less than five years, the NPV was remarkably high, at 95% for excluding

the presence of this organism in the lower airway (9). In general, oropharyngeal cultures showed moderate sensitivity, but high specificity with a 41 % positive predictive value and a 97% negative predictivity for the CF pathogens S. aureus, P. aeruginosa and H. influenzae were noted by Armstrong et. al., who followed children with CF early diagnosed through a neonatal screening program. One of the newer methods that may increase the specificity and sensitivity of CF infection detection is fluorescence in situ hybridization (12) analysis of clinical samples from CF patients (13). (14).

4. CONCLUSION

Some of the elements that affect transmission include the type of bacterial strain, the patient's immune system, and the usage of infected medical equipment. Because they are in charge of nosocomial spread of the microbe to other patients while they are receiving treatment, all CF patients colonized or infected with the primary pathogens discussed in this article must be kept in a separate room. Even if CF patients' bacterial infection epidemiology has grown more complicated, their life expectancy is still rising. This has made it easier to control the spread of these viruses by isolating CF patients in adult and pediatric treatment facilities.

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