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A PROSPECTIVE DESCRIPTIVE RESEARCH TO ASSESS THE P. AERUGINOSA FREQUENCY & ANTIMICROBIAL RESISTANT STRAINS IN BRONCHIECTASIS CASES

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Abstract:

Objective: *We aimed to discover the presence and frequency of Pseudomonas aeruginosa multiple antimicrobial resistant strains (P. aeruginosa) in Post tuberculosis (TB) bronchiectasis patients.*

Methodology: *We carried out this prospective descriptive research at TB OPD of Sir Ganga Ram Hospital, Lahore from October 2016 to May 2017. Patients gave their consent and samples before research commencement. The total sixty patients were in the age bracket of more than forty years, with bronchiectasis (suspected). These patients experienced spirometer test, oxidase test, Mueller Hinton sensitivity test and disk-diffusion method in order to find out the presence and frequency of Pseudomonas aeruginosa multiple antimicrobial resistant strains (P. aeruginosa) in Post tuberculosis (TB) bronchiectasis patients.*

Results: *There was a confirm association of poor function of the lung with chronic P. aeruginosa infection as observed in this research. It is still not evidence that the decline in the function of the lung is because of P. aeruginosa or it only indicates the rapid decline in the function of the lungs. The confirmation of resistant strains (P. aeruginosa, mucoid strains) presence is possible through antibiotic susceptibility test. Hence it is also a fact that a good treatment cannot rely on a single antibiotic therapy for P. aeruginosa infection patients.*

Conclusion: *Bronchiectasis incidence is frequent in the patients with an age of above forty years (middle age). Moreover, P. aeruginosa resistant strains are also highly evident in such patients.*

Keywords: *Pseudomonas Aeruginosa (PA), Bronchiectasis, Tuberculosis (TB) and Multiple Antimicrobial Resistance.*

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INTRODUCTION:

Bronchiectasis is permanent and abnormal bronchi dilation and a chronic disease of lungs which is often very much difficult to manage and treat. The damaged airway has a link with the combined infection and inflammatory mediators which release during the process [1]. Diagnosis of the Bronchiectasis is possible through HRCT and radiographs of the chest [2, 3]. The knowledge of Bronchiectasis presence prompts to a possible investigation of related causes and also about all the related treatable issues [4].

The USA faces the repeated respiratory tract infection presence by various microorganisms such as Haemophilus influenza, Pseudomonas aeruginosa, Staphylococcus aureus, Streptococcus pneumonia and Moraxella catarrhalis. Among all these microorganisms repeated incidence is of P aeruginosa infection in the patients [5].

In the light of emerging evidence, P. aeruginosa is responsible for the stimulation of inflammatory and neutrophilic mediator response in patient's airway [6]. P. aeruginosa presence has also a link with increased production of the sputum, more extensive visibility of the bronchiectasis through CT scan, reduce life quality and more cases of hospital admission [7].

Biofilm micro colonies face a resistance which is often because of P. aeruginosa, it also extends resistance to various other antibiotics [8, 9]. P. aeruginosa hyper mutable strains exhibit an increase in the mutation rate which is very much common in the chronic cases of infection as it also occurs in patients with cystic fibrosis lungs [10]. An increase in the P. aeruginosa multi-drug resistant strains frequency limits adversely the therapeutic options availability. Various research studies would be helpful for the physicians in order to enhance available therapeutic options for treatment. Nepal also presents limited data on the P. aeruginosa antimicrobial susceptibility [10].

METHODOLOGY:

We carried out this prospective descriptive research at TB OPD of Sir Ganga Ram Hospital, Lahore from October 2016 to May 2017. Patients gave their consent and samples before research commencement. The total sixty patients were in the age bracket of more than forty years, with bronchiectasis (suspected). These patients experienced spirometer test, oxidase test, and Mueller Hinton sensitivity test and disk-diffusion method in order to find out the presence and frequency of Pseudomonas aeruginosa multiple antimicrobial resistant strains (P. aeruginosa) in Post tuberculosis (TB) bronchiectasis patients. We included 22 females and 38 males in this particular research who confirmed cases of post-TB bronchiectasis with strong radiological and clinical outcomes. These investigations confirmed through the evaluation of influence and antimicrobial susceptibility of P. aeruginosa. Under the instructions of physicians, patients experienced Chest X-rays and CT scans for the confirmation of damage to lungs that is because of P. aeruginosa. A questionnaire helped in the data collection from the patients. Fresh specimen of samples processed in the pathology laboratory of the hospital for smear assessment and culturing.

All patients experienced Spirometry test and air escaping from nose maintained through soft nose clips. We distributed microorganism through filtered mouthpieces. Patients gave throat swabs and sputum for microbiological assessment. Various biochemical assessments confirmed the growth of the bacteria.

Every positive P. aeruginosa sample plate assessed for the approximation of mucoid P. aeruginosa strains that causes the formation of biofilm and also causes antimicrobial resistance. Mueller Hinton sensitivity test evaluated the P. aeruginosa antimicrobial sensitivity.

P. aeruginosa susceptibility verification done through a disk-diffusion method in all plates to various antibiotic discs such as ceftazidime, amoxicillin-clavulanic acid, meropenem and ciprofloxacin. Our research employed few chosen antibiotic because of non-availability of other antibiotics groups. All the outcomes are further elaborate on the research findings.

RESULTS:

The research included 22 females (36%) and 38 males (64%) with an age of above or under forty years (Table – I). We reported outcomes about active smoking, smokers and ex-smokers. There was a clear decrease in the function and volume of the lung. We also verified prevalence, viscosity and volume of the sputum in the light of the current scoring system. These outcomes also show a damaged function of the lungs. Various sputum colours are also observable in the patients with various proportions mentioned in the tabular data.

There was a confirm association of poor function of the lung with chronic P. aeruginosa infection as observed in this research. It is still not evidence that the decline in the function of the lung is because of P.

aeruginosa or it only indicates the rapid decline in the function of the lungs. The confirmation of resistant strains (P. aeruginosa, mucoid strains) presence is possible through antibiotic susceptibility test. Hence it is also a fact that a good treatment cannot rely on a single antibiotic therapy for P. aeruginosa infection patients. Detailed outcomes analysis is as under:

Table – I: Age Distribution among Males and Females (60)

Gender	Age	Number	Percentage
Male	Above 40	38	63.33
Female	Above 40	22	36.67

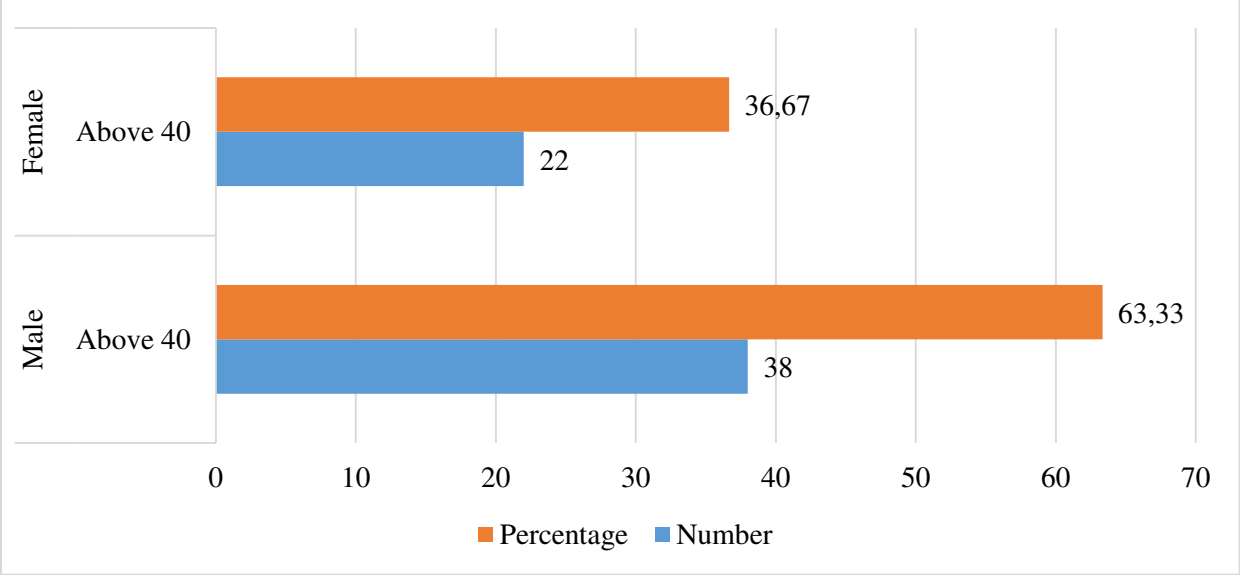


Table – II: Spirometer Test Outcomes (60)

FEV1 %		FVC %		FEV1/FVC ratio	
From	To	From	To	From	To
50	75	65	82	51	67

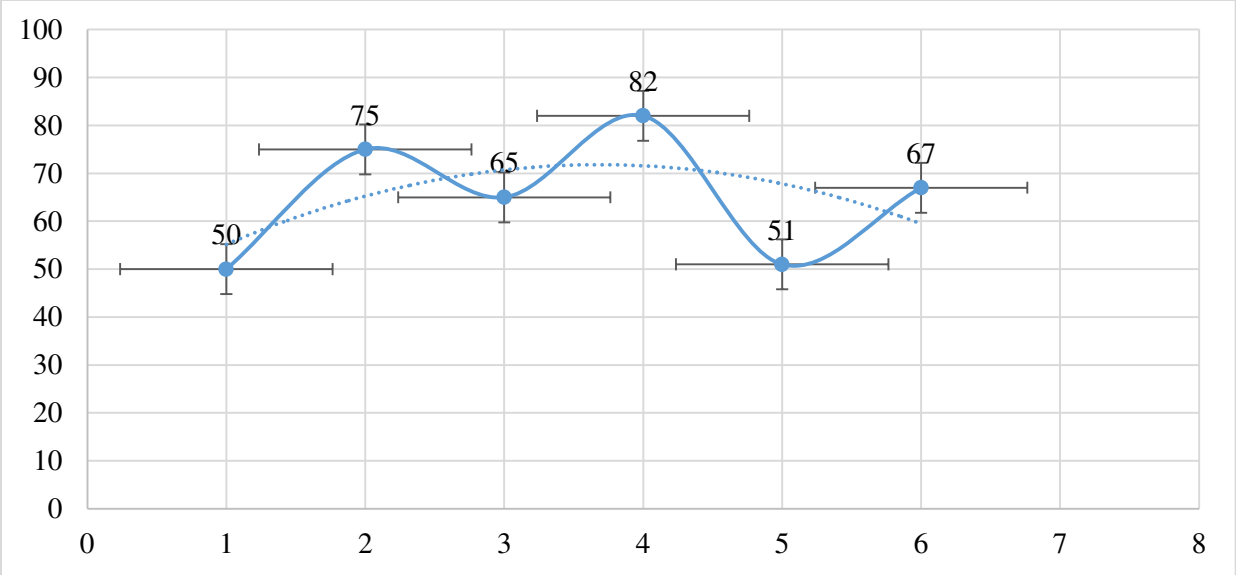


Table – III: Demography of Patients (Smokers = 60)

Female	Male	Post TB Etiology	Active Smokers	Ex-Smokers	Other Sources of Smoke Inhalation	Non Smokers
23	39	60	24	14	15	9

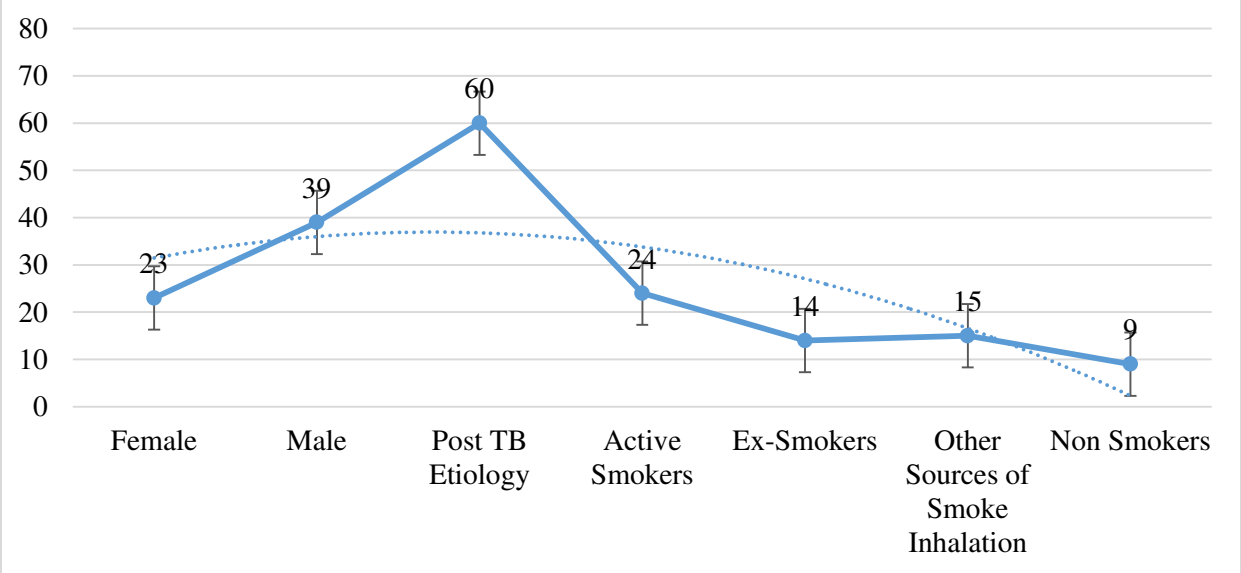


Table – IV: Sputum Analysis (60)

Grey sputum	Opaque/milky white sputum	Sputum Purulence Mucopurulent sputum	Sputum Volume 0-30mL volume
26	30	60	30

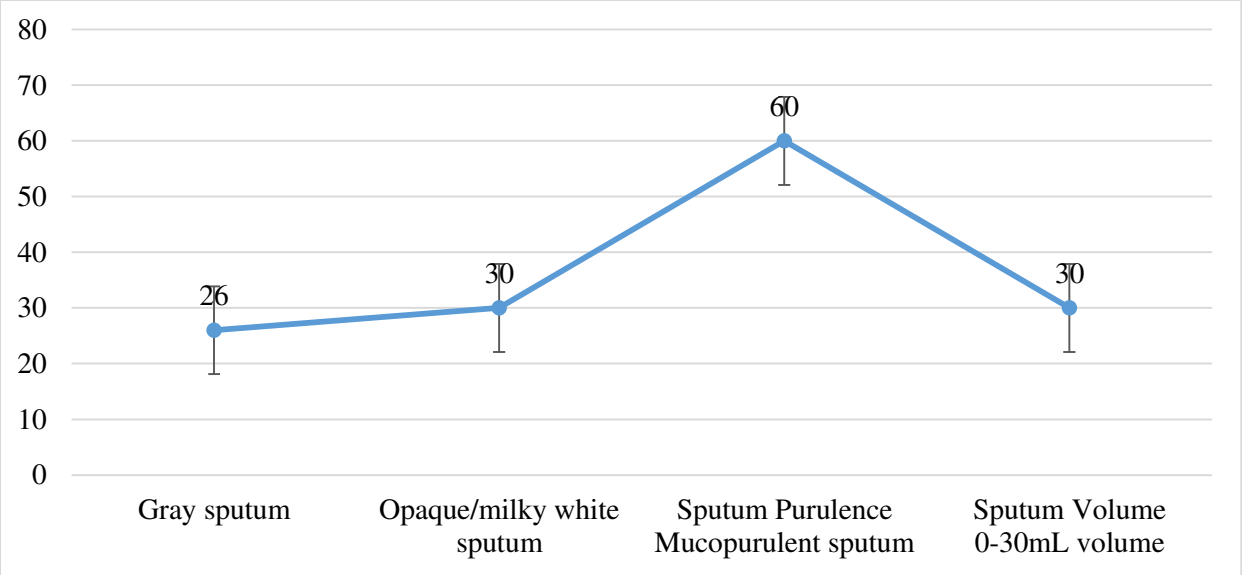
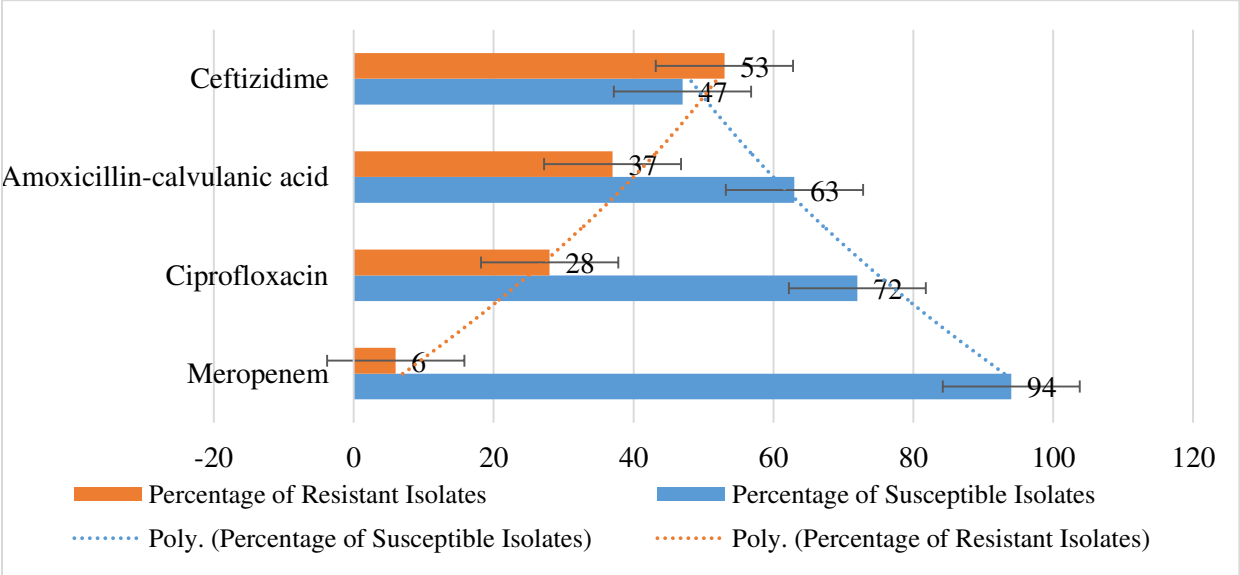


Table – V: Antibiotic Susceptibility (60)

Antibiotic Names	Percentage of Susceptible Isolates	Percentage of Resistant Isolates
Meropenem	94	6
Ciprofloxacin	72	28
Amoxicillin-calvulanic acid	63	37
Ceftizidime	47	53



DISCUSSION:

As this research design was descriptive and perspective; so, assessment of an acquired disease or underlying genetic was not necessary. However, the outcomes are comparable with the other authors who conducted research studies on adult bronchiectasis patients [12]. Our sample was in the age bracket of (35 – 80) years as the commonness of bronchiectasis is more in this stage of age. Weycker et al also reported same age group who encountered

bronchiectasis frequently [13].
The FEV-1 percentage was in the range of (50% – 75%), which less than the normal range limits. Decreased function of the lungs is also because of the FVC and FEV-1/FVC respective percentages of (65% – 82%) & (51% – 67%). These outcomes are the same as reported by Martinez GMA back in 2007, his research outcomes clearly demonstrated an accelerated decrease in the function of lung linked with the P. aeruginosa chronic colonization [14].

Chinese bronchiectasis patients also reported P. aeruginosa as a vital pathogen, which is also the same as we observed in our research outcomes in severe exacerbations of P. aeruginosa [15]. Assessment parameters for the damage to the lung in P. aeruginosa colonization patients indicated the severe exacerbations and reduced function of the lung. Guerreiro reported the same back in 1993, which is supporting our research findings as P. aeruginosa caused increased lung function decline [16].

The outcomes of the isolated P. aeruginosa relative frequencies in the bronchiectasis cases were not the same as reported in the Western studies conducted on sputum [17]. As Bronchiectasis is primarily prevalent in the Eastern and Western under developed nations and more controlled in the Western countries. These outcomes are supporting our research outcome about the colonization of P. aeruginosa in the patients of Bronchiectasis. It is out believed that this research is unique as it targets the P. aeruginosa infection or colonization link with the higher sputum outcomes and moderately severe obstruction of the airflow.

Most effective single agents were Meropenem and Colistin as reported in our research. Moreover, it is also very much necessary that there is no association between drug class or growth mode and activity of the bacteria. Meropenem, Tobramycin and Colistin were bactericidal more isolates in comparison to the amoxicillin clavulanic acid, ciprofloxacin and ceftazidime. Few cases also reported resistance to Colistin; whereas, other studies scarcely reported such occurrences [18].

CONCLUSION:

P. aeruginosa resistant strains are more prevalent in post-TB Bronchiectasis patients with poor function of the lung that provides a chance to form microbe colonies. Bronchiectasis incidence is frequent in the patients with an age of above forty years (middle age). Moreover, P. aeruginosa resistant strains are also highly evident in such patients.

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