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ORIGINAL ARTICLE

Pattern of Antibiotic Susceptibility of Bacteria Isolated from Patients of Bronchiectasis in ICU of NIDCH and Identification of Causes of their Antibiotics Resistance

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Abstract

Background and objective*: Antibiotics are usually started empirically in the bronchiectatic patients of ICU. The knowledge of pattern of local bacterial growth and their susceptibility to antibiotics is essential in selecting empirical antibiotic. Appropriate use of antibiotic in patients of bronchiectasis in ICU is crucial for optimal outcome. Antibiotic resistance pattern varies from one country to another even among health centres specially ICU. This study was conducted to know the current organisms and pattern of their antibiotic susceptibility in patients of bronchiectasis in ICU of NIDCH and identification of risk factors for their antibiotic resistance.*

Patients and Methods: *This cross-sectional study was conducted at the Intensive Care Unit(ICU) of National Institute of Diseases of the Chest and Hospital (NIDCH) for 1 years of period from july2019 to june2020. Total 50 patients with bronchiectasis admitted to ICU of NIDCH whose sputum or endotracheal specimen showed bacterial growth were included.*

Results: *Most common pathogen isolated was* Pseudomonas species *(40%), followed by* Acinetobacter species *(28%),* Klebsiella species *(20%),* Staphylococcus aureus *(16%),* Enterobacter species *(12%). Pathogens were sensitive to Colistin (100%), followed by Tigecycline, Amikacin, Levofloxacin, Meropenem, Cotrimoxazol whereas resistant to Ampicillin, Cefuroxime, Cefixim, Cefepime, Amoxicilin+clavulonic acid. Factors for antibiotic resistance found were patients taking antibiotic without doctor's prescription (62%), taking various type of antibiotic (56%), taking antibiotic on increased interval (52%), taking inadequate dose of antibiotics(50%), old age e"60 years (40%)and malnutrition(16%).*

Conclusion: *For patients of bronchiectasis in ICU consider empirical antimicrobial agent that covers Gram negative infection. Patients having risk factors for antibiotic resistance should be also considered during use of antibiotics.*

Key words: *Bronchiectatic patients of ICU,Current Bacterial Antibiotic Susceptibility,Causes of Resistance.*

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Introduction:

Bronchiectasis is described as indelibly dilated airways due to chronic or recurrent infection and chronic bronchial inflammation caused by improper clearance of several microorganisms.[1]

Recurrent attacks are a fundamental cause of morbidity and mortality and may promote significant economic and social costs.[2] Bronchiectasis is a heterogeneous chronic disease. Heterogeneity present both in stable and during exacerbations. Although the scientific community recognizes that bacterial infection is a cornerstone in the development of bronchiectasis exacerbations.[3]

Bacteria most commonly isolated from the airways of patients with bronchiectasis include Haemophilus influenzae, Pseudomonas aeruginosa, Streptococcus pneumoniae, Staphylococcus aureus and Moraxella catarrhalis.[4] These colonizing pathogens commonly show antimicrobial resistance arising from intrinsic resistance mechanisms or frequent exposure to varieties of antimicrobial agents.

Patients with bronchiectasis were frequently exacerbations have been viewed as being exclusively bacterial, those patients treated with intravenous antibiotic therapy had a good clinical response.[5] So identification and appropriate treatment of these organisms is an essential part of the management of bronchiectasis. Dominant bacteria were Pseudomonas aeruginosa and Haemophilus influenza worldwide.[6] But emerging pathogens in the airways of people with bronchiectasis and the geographical and community differences together with ethnic variation warrant further investigation.[7]

Hospitalized patients usually have more severely compromised lung function, and the spectrum of the causative organisms could be different. Furthermore, emergence of resistant bacteria is a potential threat, especially in developing countries.[8] Causes of which may be due to frequent administration of antibiotic by self or prescribed form, inadequate dose or duration, frequent exacerbation or de novo infection with drug resistant organism. Epidemiological studies have clearly demonstrated direct relationship between antibiotic consumption and the emergence and dissemination of resistant strains.[9]

Exacerbation of bronchiectasis has detrimental effect on one's quality of life, most of them require hospitalization and parenteral antibiotics. The current treatment option focused on the use of directed antibiotic treatment aimed at pathogen reduction as well as pathogen eradication. Empirical antibiotics should be started while awaiting sputum microbiology.[10] Infection caused by resistant organism is associated with high morbidity, prolonged hospital stay and reduced quality of life. Moreover, it accounts for a large proportion of the clinical workload, health burden to the individual and the economic impact on health care systems internationally, which is far more immense in developing countries like Bangladesh.

Use of optimal antibiotic is crucial, especially in an era of rising antibiotic resistance and lack of new antimicrobial development.[11] Infections caused by MDR gram-negative organisms are associated with high morbidity and mortality.[12] Moreover, the financial burden of antimicrobial resistance can be significant as a result of prolonged hospitalizations due to antibiotic treatment failures. The economic impact of antibiotic resistance can be measured not only through direct health care expenses but also through health burden to the individuals affected and to the society.[13]

The impact of antibiotic resistant bacteria is suggested to be far more serious in low and middle income countries (LMICs) than in well-resourced countries, where unregulated antimicrobial use, and poor infection control practices may result in increased numbers of infections related to resistant bacteria.[8] Routine screening is vital due to the circulation of resistant organisms in the community resulting high mortality rate of patients of bronchiectasis in Intensive Care Unit (ICU).[14] In the emergence of drug resistance, antibiotic susceptibility pattern should be monitored regularly.

Materials and Methods

This was a cross-sectional study and was conducted at the Intensive Care Unit of National Institute of Diseases of the Chest and Hospital (NIDCH) for 1 years of period from July 2019 to June 2020. Total 50 patients in ICU with bronchiectasis were included after screening in according to the

inclusion criteria with patients of bronchiectasis in ICU of NIDCH whose sputum or endotracheal specimen showed bacterial growth were included in this study & Radiological evidence considered for diagnosis of bronchiectasis and exclusion criteria with patients transferred from another ICU where stayed for more than 48 hours. Study samples were selected by purposive sampling who fulfilled the criteria. Data were presented in frequency, percentage and mean and standard deviation as applicable. Chi square test was used for categorical variables. Univariate and Multivariate logistic analysis were used for risk factors. P value of less than 0.05 was considered as significant.

Results:

Total 50 patients with bronchiectasis in the ICU of NIDCH were included in this study with the main aim to explore the spectrum of bacteria isolated from sputum or endotracheal specimen cultures and their susceptibility to antibiotics and to evaluate the possible factors responsible for antibiotic resistance among pathogenic organism.

Average age of all patients was 51.04±16.43 years. Maximum age was 75 years and minimum age 17 years. Major part (58%) of the patients was aged 50 years or above. Greater part of the patients was male (80%) and rest 20% were female. Maximum patients were from rural (64%) and rest 36% were from the urban residence. Of all, 52% of patients were from lower class followed by middle class (44% and only 4% were belonged to higher socio-economic status.

Table-I

Demographic characteristics of the study patients (n=50)

Demographic characteristics	Number of patients	Percentage
Sex		
Male	40	80%
Female	10	20%
Mean age (years)	51.04	±16.43
Range (min-max)	17.0	-75.0

Table represent percentage (%);
Chi-squared Test was done to analyze the data.

We found patients with bronchiectasis were infected by Pseudomonas species (40%) , Acinetobacter species (28%), Klebsiella species (20%), Staphylococcus aureus (16%), Enterobacter species (12%) and Candida species (8%).

Table-II

Identification of the isolated organisms from sputum culture of patients with bronchiectasis in ICU of NIDCH. (n=50)

	Frequency	Percent
Pseudomonas species	20	40
Acinetobacter species	14	28
Klebsiella species	10	20
Staphylococcus aureus	8	16
Enterobacter species	6	12
Candida species	4	8

Table represent percentage (%);
Chi-squared Test was done to analyze the data

Table II shows that maximum patients were infected by *Pseudomonas species* (40%) followed by *Acinetobacter species* (28%), *Klebsiella species* (20%), *Staphylococcus aureus* (16%), *Enterobacter species* (12%) and *Candida species* (8%).

Out of 20 Pseudomonas species, all were sensitive(100%) to Colistin whereas all were resistant(100%) to Ampicillin, Cefuroxime and Cefepime.

Out of 14 Acinetobacter species, all were sensitive(100%) to Collistin whereas resistance showed to Amoxicilin+clavulanic acid(85.71%) and Ceftriaxone(78.57%).

Out of 10 Klebsiella species, all 10 Klebsiella species were sensitive(100%) to Collistin whereas all were resistant(100%) to Ampicillin, Amoxicilin+ clavulonic acid, Ceftriaxone, Cefixim, Cefuroxim, Cefepime.

Out of 8 Staphylococcus aureus, all 8 Staphylococcus aureus were sensitive to Ceftazidim, cotrimoxazole, Collistin and Tigecycline whereas all showed resistance(100%) to Ampicillin, Ceftriaxone, Cefepime and Imipenem.

Out of 6 Enterobacter species, all were sensitive(100%) to colistin, Tigecycline and also sensitive(50%) to Clotrimoxazol and showed resistance(100%) to rest all antibiotics.

For identification of risk factors for antibiotic resistance, we found most of the patients had h/o taking antibiotic without doctor's prescription (62%), h/o taking various type of antibiotic (56%) and h/o taking antibiotic on increased interval (52%). Half (50%) of the total patients had h/o taking inadequate dose of antibiotic. 40% patients were in old age (e"60 years) and 16% suffered from malnutrition

Tablie-III

Antibiotics sensitivity pattern of Pseudomonas species among patients (n=20)

Antibiotic	Sensitive	Resistant
Ampicillin	0 (0%)	20 (100%)
Amoxicilin+clavulonic acid	1 (5%)	19 (95%)
Ceftriaxone	8 (40%)	12 (60%)
Cefixim	7 (35%)	13 (65%)
Cefuroxim	0 (0%)	20 (100%)
Cefepime	0 (0%)	20 (100%)
Ceftazidim	7 (35%)	13 (65%)
Levofloxacin	4 (20%)	16 (80%)
Ciprofloxacin	6 (30%)	14 (70%)
Cotrimoxazol	2 (10%)	18 (90%)
Cefoperazone+sulbactum	10 (50%)	10 (50%)
Gentamycin	13 (65%)	7 (35%)
Amikacin	16 (80%)	4 (20%)
Meropenem	10 (50%)	10 (50%)
Imipenem	8 (40%)	12 (60%)
Pipericillin+Tazobactam	11 (55%)	9 (45%)
Aztreonam	12 (60%)	8 (40%)
Collistin	20 (100%)	0 (0%)
Tigecycline	14 (70%)	6 (30%)

Table represent percentage (%);
Chi-squared Test was done to analyze the data

Table III shows that out of 20 *Pseudomonas species* were sensitive to Colistin (100%), Amikacin (80%), Meropenem (50%), whereas were resistant(100%) to Ampicillin, Cefuroxime and Cefepime.

Table-IV

Antibiotics sensitivity pattern of Acinetobacter species among patients (n=14)

Antibiotic	Sensitive	Resistant
Ampicillin	2 (14.28%)	12 (85.71%)
Amoxicilin+clavulonic acid	2 (14.28%)	12 (85.71%)
Ceftriaxone	3 (21.42%)	11 (78.57%)
Cefixim	5 (35.71%)	9 (64.29%)
Cefuroxim	2 (14.28%)	12 (85.71%)
Cefepime	2 (14.28%)	12 (85.71%)
Ceftazidim	8 (57.14%)	6 (42.85%)
Levofloxacin	1 (7.14%)	13 (92.86%)
Ciprofloxacin	4 (28.57%)	10 (71.43%)
Cotrimoxazol	4 (28.57%)	10 (71.43%)
Cefoperazone+sulbactum	5 (35.71%)	9 (64.29%)
Gentamycin	4 (28.57%)	10 (71.43%)
Amikacin	4 (28.57%)	10 (71.43%)
Meropenem	3 (21.42%)	11 (78.57%)
Imipenem	3 (21.42%)	11 (78.57%)
Pipericillin+Tazobactam	3 (21.42%)	11 (78.57%)
Aztreonam	4 (28.57%)	10 (71.43%)
Collistin	14 (100%)	0 (0%)
Tigecycline	11 (78.57%)	3 (21.42%)

Table represent percentage (%);
Chi-squared Test was done to analyze the data

Table IV shows that out of 14 *Acinetobacter species* were sensitive to Collistin(100%), Tigecycline(80%), whereas resistance showed to Amoxicilin+ clavulonic acid(85.71%), Ceftriaxone(78.57%).

Table-V

Antibiotics sensitivity pattern of Klebsiella species among patients (n=10)

Antibiotic	Sensitive	Resistant
Ampicillin	0 (0%)	10 (100%)
Amoxicilin+clavulonic acid	0 (0%)	10 (100%)
Ceftriaxone	0 (0%)	10 (100%)
Cefixim	0 (0%)	10 (100%)
Cefuroxim	0 (0%)	10 (100%)
Cefepime	0 (0%)	10 (100%)
Ceftazidim	2 (20%)	8 (80%)
Levofloxacin	7 (70%)	3 (30%)
Ciprofloxacin	2 (20%)	8 (80%)
Cotrimoxazol	2 (20%)	8 (80%)
Cefoperazone+sulbactum	2 (20%)	8 (80%)
Gentamycin	3 (30%)	7 (70%)
Amikacin	3 (30%)	7 (70%)
Meropenem	4 (40%)	6 (60%)
Imipenem	2 (20%)	8 (80%)
Pipericillin+Tazobactam	1 (10%)	9 (90%)
Aztreonam	2 (20%)	8 (80%)
Collistin	10 (100%)	0 (0%)
Tigecycline	8 (80%)	2 (20%)

Table represent percentage (%);
Chi-squared Test was done to analyze the data

Table V shows that out of 10 *Klebsiella species* were sensitive to Collistin (100%), Tigecycline (80%), Levofloxacin (70%) whereas were resistant(100%) to Ampicillin, Amoxicilin+clavulonic acid, Ceftriaxone, Cefixim, Cefuroxim, Cefepime.

Table-VI

Antibiotics sensitivity pattern of Staphylococcus aureus among patients (n=8)

Antibiotic	Sensitive	Resistant
Ampicillin	0 (0%)	8 (100%)
Amoxicilin+clavulonic acid	4 (50%)	4 (50%)
Ceftriaxone	0 (0%)	8 (100%)
Cefixim	3 (37.5%)	5 (62.5%)
Cefuroxim	3 (37.5%)	5 (62.5%)
Cefepime	0 (0%)	8 (100%)
Ceftazidim	8 (100%)	0 (0%)
Levofloxacin	3 (37.5%)	5 (62.5%)
Ciprofloxacin	3 (37.5%)	5 (62.5%)
Cotrimoxazol	8 (100%)	0 (0%)
Cefoperazone+sulbactum	3 (37.5%)	5 (62.5%)
Gentamycin	6 (75%)	1 (12.5%)
Amikacin	1 (12.5%)	7 (87.5%)
Meropenem	2 (25%)	6 (75%)
Imipenem	0 (0%)	8 (100%)
Pipericillin+Tazobactam	3 (37.5%)	5 (62.5%)
Aztreonam	6 (75%)	2 (25%)
Collistin	8 (100%)	0 (0%)
Tigecycline	8 (100%)	0 (0%)

Table represent percentage (%);
Chi-squared Test was done to analyze the data

Table VI shows that out of 8 *Staphylococcus aureus* were sensitive to cotrimoxazole(100%), Tigecycline (100%), whereas showed resistance(100%) to Ceftriaxone.

Table-VII

Antibiotics sensitivity pattern of Enterobacter species among patients (n=6)

	Sensitive	Resistant
Ampicillin	0 (0%)	6 (100%)
Amoxicilin+clavulonic acid	0 (0%)	6 (100%)
Ceftriaxone	0 (0%)	6 (100%)
Cefixim	0 (0%)	6 (100%)
Cefuroxim	0 (0%)	6 (100%)
Cefepime	0 (0%)	6 (100%)
Ceftazidim	0 (0%)	6 (100%)
Levofloxacin	0 (0%)	6 (100%)
Ciprofloxacin	0 (0%)	6 (100%)
Cotrimoxazol	3 (50%)	3 (50%)
Cefoperazone+sulbactum	0 (0%)	6 (100%)
Gentamycin	0 (0%)	6 (100%)
Amikacin	0 (0%)	6 (100%)
Meropenem	0 (0%)	6 (100%)
Imipenem	0 (0%)	6 (100%)
Pipericillin+Tazobactam	0 (0%)	6 (100%)
Aztreonam	0 (0%)	6 (100%)
Collistin	6 (100%)	0 (0%)
Tigecycline	6 (100%)	0 (0%)

Table represent percentage (%);

Chi-squared Test was done to analyze the data

Table VII shows that out of 6 *Enterobacter species* were sensitive to colistin (100%), Tigecycline(100%), Cotrimoxazol(50%) and rest all antibiotics showed 100% resistance.

Table-VIII

Identified risk factors of developing antibiotic resistance among patients (n=50)

	Frequency	Percent
H/o taking inadequate dose of antibiotic	25	50%
H/o taking short duration of antibiotic	20	40%
H/o taking antibiotic on increased interval	26	52%
H/o taking antibiotic without doctor's prescription	31	62%
H/o taking various type of antibiotic	28	56%
Old age	20	40%
Malnutrition	8	16%

Table represent percentage (%);
Chi-squared Test was done to analyze the data

Table VIII shows that most of the patients had h/o taking antibiotic without doctor's prescription (62%), h/o taking various type of antibiotic (56%) and h/o taking antibiotic on increased interval (52%). Half (50%) of the total patients had h/o taking inadequate dose of antibiotic. 40% patients were in old age (≥60 years) and 16% suffered from malnutrition.

Discussion:

This cross-sectional observational study was performed in the Intensive care unit(ICU) of NIDCH, Dhaka, to explore the spectrum of bacteria isolated from sputum culture and their susceptibility to antibiotics in patients of bronchiectasis. Total 50 patients with bronchiectasis in ICU were included in this study.

In this study it was observed that mean age of all patients was 51.04±16.43 years (17-75 years) with male predominance (80%). Majority (58%) of the patients were aged 50 years or more. This findings correlate with others study[15-17]. A study[18] found ninety five percent (142 cases), and 5 % (8cases) of patients were male and female respectively. However, unlike age distribution, sex distribution was not compatible with several studies. In a study[19] only 30.2% were males and in another study[5] found 31.3% were males.

Most (68%) of the patients had cylindrical type of bronchiectasis whereas rest 32% had cystic-varicose type of bronchiectasis. Like us, a study[18] found the majority of patients had cylindrical type and minor percent have varicose type BE. Another study[6] found 73% patients with cylindrical type and 27% with cystic-varicose type of bronchiectasis

We found majority of the patients were infected by single organism (80%) and rest by dual organism (20%). Most of the patients were infected by *Pseudomonas species* (40%) followed by *Acinetobacter species* (28%), *Klebsiella species* (20%), *Staphylococcus aureus* (16%), *Enterobacter species* (12%) and *Candida species* (8%). In a study,[5] in 32 exacerbations of Bronchiectasis sputum bacteriology showed *P. aeruginosa* in 19 Patients (59.3%). In another study,[12] among 33 patients with exacerbation of bronchiectasis, normal flora in sputum was found in 24% with most frequent isolates were: *P. aeruginosa* (30%), *H. influenzae* (6%), *Streptococcus spp.* (3%), MSSA (15%), MRSA

(6%) of patients. In another study[16] conducted prospectively at King Khalid University Hospital (KKUH) and Sahary Chest Hospital in Riyadh, *Pseudomonas aeruginosa (PA)* was the most common organism (43%). In a study[21] commonest organism isolated from sputum was *Pseudomonas aeruginosa* (34%) and *Haemophilus influenzae* (19%), respectively. In the study[19] commonest organisms were *Pseudomonas aeruginosa*. Furthermore, in our study there was no growth of *Haemophilus influenzae*, which was conflicting with other previous studies. This may be due to the fastidious nature of *Haemophilus influenza* which requires supplemented media to isolate. Also, *Haemophilus influenza* may be overgrown by other bacteria.

We found isolated organisms were sensitive to few antibiotics whereas resistant to multiple antibiotics. All 20 Pseudomonas species were sensitive(100%) to Colistin whereas all were resistant(100%) to Ampicillin, Cefuroxime and Cefepime. Out of 14 Acinetobacter species, all were sensitive(100%) to Collistin whereas resistance showed to Amoxicilin+clavulanic acid(85.71%) and Ceftriaxone(78.57%). All 10 Klebsiella species were sensitive(100%) to Collistin whereas all were resistant(100%) to Ampicillin, Amoxicilin+ clavulonic acid, Ceftriaxone, Cefixim, Cefuroxim, Cefepime. All 8 Staphylococcus aureus were sensitive to Ceftazidim, cotrimoxazole, Collistin and Tigecycline whereas all showed resistance(100%) to Ampicillin, Ceftriaxone, Cefepime and Imipenem Out of 6 Enterobacter species, all were sensitive(100%) to colistin, Tigecycline and also sensitive(50%) to Clotrimoxazol and showed resistance(100%) to rest all antibiotics.

We also found various risk factors for antibiotic resistance present in studied patients with bronchiectasis. Identified risk factors were taking previous antibiotics without doctor's prescription (62%), taking different types of antibiotic (56%) and history of taking antibiotic on increased interval (52%). Half (50%) of the total patients had history of taking inadequate dose of antibiotic. Old age,e"60 years(40%) and malnutrition(16%) were also found risk factors for antibiotic resistance. In a study[14] risk factors for antibiotic resistance found were co-exist illness, chronic disease and immune deficiency conditions.

These microbial profiles of pathogens causing infective exacerbation of bronchiectasis may differ between hospitals and ICU settings, even within the same institution. Therefore, surveillance of bacterial susceptibility should be conducted and local epidemiological data should be provided for every ICU. Because of increasing rate of lungs colonization with resistant strains, it is recommended that in lower respiratory tract infections screening programs for resistant organisms being implemented routinely in hospital settings.[18] This information can help in guiding the initial empiric antibiotic therapy, which would be helpful in decreasing mortality and preventing development of MDR bacteria. Antibiotic choices based on published guidelines may be ineffective if local microbial flora shows different susceptibility patterns. Therefore, this study might help to find out most common pathogen associated with bronchiectasis in ICUs and its antibiotic sensitivity pattern which is useful to modify antibiotic policy of bronchiectasis in our hospital ICUs to reduce emergence of multidrug-resistant organisms and morbidity, mortality associated with bronchiectasis. Furthermore, in order to achieve higher levels of evidence, further studies with larger sample size and different study design would be desirable to find out the risk factors for developing antibiotic resistance.

Limitation of the study

The study population was selected from a single tertiary care specialized center. Therefore, it might not be reflective to the scenario of the country. Conventional microbiological culture sensitivity test was used, so extended antibiogram was not possible to conduct.

Conclusion:

The common identified organisms were Pseudomonas species, Acinetobacter species, klebsiella species. Isolated organisms were sensitive to colistin, tigecycline, meropenem, piperacillin-tazobactam, amikacin and resistant to ampicillin, amoxicilin+clavulanic, cefuroxime, cefepime, ceftriaxone and cefixime. We should consider antimicrobial agent that covers Gram negative infection. Empirical antibiotic should be combination of Piperacillin-tazobactam with Levofloxacin or Meropenam with amikacin or ceftazidim with amikacin. Taking various types of

antibiotics without doctor prescription is the most common factor for developing antibiotic resistance among pathogenic organisms and should be considered during use of antibiotics.

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Association Of Serum Adenosine Deaminase with Sputum Conversion at the End of Second Month and at the End of The Anti-Tuberculous Drug Treatment among New Smear Positive Pulmonary Tuberculosis Patients

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Abstract:

Background: *Tuberculosis (TB) is global public health problem. Sputum microscopy for AFB is a well-known method for treatment monitoring in case of smear positive PTB patients. But it is not always easy to obtain sputum samples at the end of treatment. Many studies have proved the role of ADA in diagnosis of tuberculosis in effusion fluids and a decrease in ADA activity at the end of treatment. But association between serum ADA level with treatment monitoring in sputum smear positive PTB cases is not widely studied.*

Objective: *To determine the association of serum adenosine deaminase with sputum conversion at the end of second month and at the end of the treatment among new smear positive pulmonary tuberculosis patients.*

Materials & Methods: *This prospective observational study was conducted in the department of respiratory medicine of National Institute of Diseases of the Chest and Hospital (NIDCH) from June 2020 to September 2021. Ninety-eight new smear positive pulmonary tuberculosis patients were enrolled in this study according to inclusion and exclusion criteria of the study. Sputum sample was collected from each subject for microscopic examination at initial, at the end of the 2nd month and at the end of 6th month. Blood was collected from each subject for measurement of serum ADA level at initial, at the end of 2nd month and at the end of 6th month. Serum ADA was measured by enzymatic photometric method using MICROEXPRESS ADA-MTB reagent and result was expressed as U/L. Data analysis was done through Statistical Package for Social Science (SPSS) version 23.*

Results: *Mean age of the study subject was 39.7±13.0 years with male (82.8%) predominance. Ultimately 10 patients were lost to follow-up and 1 died during the study period. Rest of the study subjects (87 out of 98) showed that their sputum were converted at the end of 2nd month and remained negative at the end of 6th month. Mean serum ADA level was significantly decreased at the end of 6^{th} month (21.8±5.7 U/L) than 2nd month (25.1±8.3 U/L) and baseline (29.8±11.5 U/L) (P value = 0.001). To see the association between serum ADA level and sputum smear for AFB, Analysis of Variance test was done and it revealed that at the*

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