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Chest Heart Journal
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EDITORIAL

DPLD- An Alarming Issue for Pulmonologists

S.M. Abdur Razzaque

[Chest Heart J. 2021; 45(2) : 53-56]

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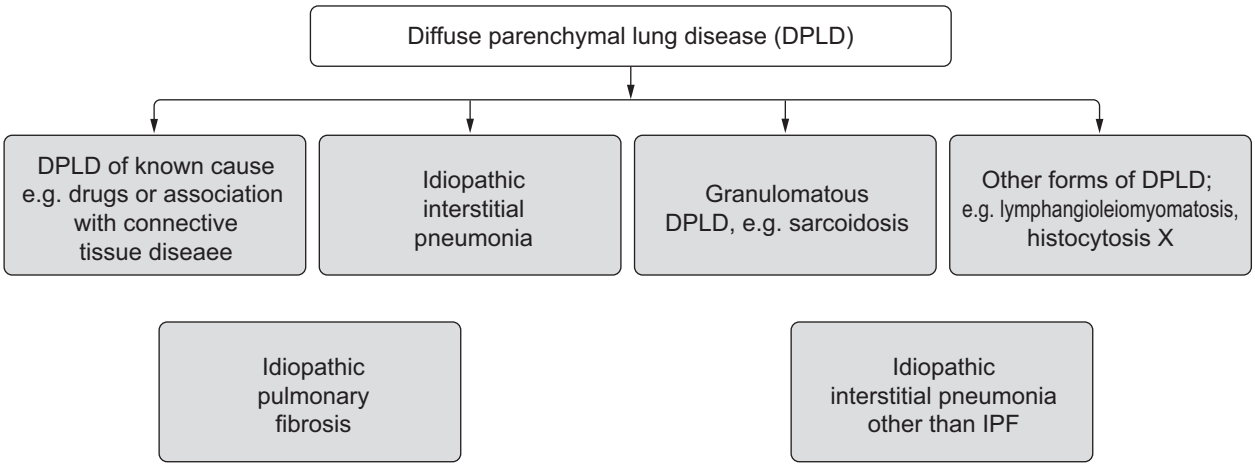
The term DPLD (Diffuse parenchymal lung disease), in general implies the clinical manifestation of inflammatory-fibrotic infiltration of the alveolar walls (septa) resulting in profound effects on the capillary endothelium and alveolar epithelial lining cells.[1]DPLD comprise a broad spectrum of disorders of varying etiology with some similarities in clinical, imaging, physiologic and pathologic features.

There are limited epidemiologic studies describing the global burden and geographic heterogeneity of interstitial lung disease (DPLD) subtypes. Among seventeen methodologically heterogenous studies that examined the incidence, prevalence and relative frequencies of DPLDs, the incidence of DPLD ranged from 1 to 31.5 per 100,000 person-years and prevalence ranged from 6.3 to 71 per 100,000 people. In North America and Europe, idiopathic pulmonary fibrosis and sarcoidosis were the most prevalent DPLDs while the relative frequency of hypersensitivity pneumonitis was higher in Asia, particularly in India (10.7–47.3%) and Pakistan (12.6%). The relative frequency of connective tissue disease DPLD demonstrated the greatest geographic variability, ranging from 7.5% of cases in Belgium to 33.3% of cases in Canada and 34.8% of cases in Saudi Arabia.[2]Studies suggest a prevalence of 81 in 1,00,000 for men compared with 67 in 1,00,000 for women.[3,4]In the United States, the mortality rate from DPLD increased twofold from 1980 to 2014.[5]

Classification of DPLD can be based on several parameters including etiology, clinical features, histopathology, or pattern of radiologic abnormalities. A classification of DPLD based on the presence or absence of an identifiable cause (including underlying systemic disease) is likely the most practical option for clinicians.[1]

The hallmarks of a DPLD are progressive dyspnea and cough, abnormal chest imaging and impairedpulmonary function results.[6,7] The initial evaluation of a patient with suspected DPLD is focused on confirming the presence of DPLD, duration of symptoms and obtaining clues to the underlying cause.[6] This is performed by assessment of demographics and findings gathered from history taking, physical examination, chest imaging and laboratory tests.



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Taking a careful history is of paramount importance in identifying the clinical manifestations. Duration of symptoms, smoking history, review of the past medications, family history of hereditary disorders, occupational history; all are important. Patients often present with cough, which is typically dry and distressing, and breathlessness, which is often insidious in onset but thereafter relentlessly progressive. Physical examination reveals the presence of inspiratory crackles and in many cases digital clubbing develops. The typical radiographic findings include in the earliest stages, ground glass and reticulonodular shadowing, with progression to honeycomb cysts and traction bronchiectasis. Pulmonary function tests typically show a restrictive ventilatory defect in the presence of small lung volumes and reduced gas transfer.[8] If the clinical, imaging and laboratory results are inconclusive, lung histopathology may be needed to reach a specific DPLD diagnosis.[1]

Idiopathic pulmonary fibrosis:

Among DPLDs, there is a subset of disorders referred to as idiopathic interstitial pneumonias (IIP) that comprise a heterogenous group of diffuse parenchymal lung diseases characterized by varying patterns of inflammation and fibrosis.[9,10] IPF (Idiopathic pulmonary fibrosis) is the most common form of IIP accounts for 20-30% of DPLDs.[4,11,12] It is associated with characteristic clinical, radiographic, physiologic and pathologic manifestations but is also a diagnosis of exclusion.The incidence and prevalence of IPF are not fully defined. A systematic review analyzing data from populationbased studies in 1968 to 2012 estimated an incidence range of to 9 cases per 1,00,000 per year for Europe and North America.[13] Both the incidence and prevalence of IPF increase markedly with age, particularly over 75 years[12] and is uncommon before the age of 50 years. There is a strong association with cigarette smoking. IPF is progressive, irreversible and usually fatal, with a portion of these deaths attributed to the phenomenon of 'acute exacerbation."The clinical course of patients with IPF is variable and can display long periods of stability, a steady gradual decline, and/or periods of acute deterioration.[14,15]

Acute exacerbation of IPF is defined as " an acute clinically significant respiratory deterioration characterized by evidence of new widespread alveolar abnormality" The diagnostic criteria include (1) previous or concurrent diagnosis of IPF, (2) acute worsening or development of dyspnea typically less than 1 month of duration, (3) CT with new bilateral ground-glass opacity and/or consolidation superimposed on a background pattern consistent with UIP pattern and (4) deterioration not fully explained by cardiac failure or fluid overload.[16]Little is known about the pathogenesis of acute exacerbation of IPF. Along with histopathology of diffuse alveolar damage, there is evidence of loss of alveolar epithelial cell integrity.[17] It has been suggested that acute exacerbation of IPF may represent a response to a clinically occult infection[18,19] but direct evidence of an association with infections is still missing.[20]

Treatment:

DPLD is not a single disease but encompasses many different pathological processes. Hence treatment is different for each disease. If a specific occupational exposure cause is found, the person should avoid that environment. If a drug cause is suspected, that drug should be discontinued.

Many cases due to unknown or connective tissue-based causes are treated with corticosteroids, such as prednisolone.[21] Some people respond to immunosuppressant treatment.

Treatment of IPF: IPF is a progressive and fatal disorder without any spontaneous remission and, until the recent introduction of antifibrotic therapy, no therapy had been shown to be effective.

Era before antifibrotic therapy: Although corticosteroids alone were the mainstay for the treatment of IPF for many years, the response to corticosteroid in IPF has been almost uniformly poor. In addition, significant complications can result from corticosteroid therapy, affecting the quality of life. Because of poor response of IPF to corticosteroids, various immunomodulatory agents were tried but studies on combination therapy (prednisone, azathioprine and N-acetylcystine) was shown to be associated with increased rate of death and hospitalizations compared with placebo.[1]

Current Era: On the basis of accumulating knowledge about the pathogenic mechanisms involved in IPF, newer antifibrotic agents i.e. Pirfenidone and Nintedanib have been developed. Pirfenidone is a novel antifibrotic agent that inhibits

progression of fibrosis in animal models. Nintedanib is a tyrosine kinase inhibitor that targets platelet-derived growth factor receptor, vascular endothelial growth factor receptors and fibroblast growth factor receptors. Both pirfenidone and nintedanib reduce the rate of FVC decline by approximately 50% over 1 year of treatment in patients with IPF. Pooled data analysis and post adhoc analysis suggest these drugs may improve quality of life, reduce the rate of hospitalizations and acute exacerbations, and prolong survival. Combination therapy with both pirfenidone and nintedanib is being explored. Given the scarcity of donars along with age consideration and comorbidities seen in IPF patients, lung transplantation is indicated only in carefully selected patients with severe lung disorders unresponsive to pharmacological treatment.[1]

Management of acute exacerbation has generally consisted of enhanced immunosuppression with pulse dose of methylprednisolone, sometimes combined with another immunosuppressive agent, such as cyclophosphamide or cyclosporine, but no convincing evidence of benefit has been demonstrated.[1] Management of other comorbidities including Gatroesophageal reflux disease, pulmonary hypertension, sleep-related breathing disorder, lung cancer and other issues must be sorted out.

Despite the advancement of medical science, the longterm survival in IPF is distinctly poor, after diagnosis the median survival is approximately 3 years; with only 20-35% survive up to 5 years.[1]

Using a database from the National Center for Health Statistics, OLSON et al.[22]clearly show for the first time that the mortality rates have increased from 1992 to 2003. Although these data do not confirm that the prevalence is increasing, they do suggest that there have been improvements in reporting and identification of fibrotic lung diseases. But still a vast of majority of patients are remain undiagnosed. Early recognition of symptoms, appropriate diagnosis ang comprehensive care of patients are essential to reduce the current mortality and morbidity resulting from DPLD.

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Chest Heart Journal
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ORIGINAL ARTICLE

Health Care Seeking Pattern among Out Patient Department (OPD) Patients in a Tertiary Care Chest Hospital, Dhaka

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Jalal Mohsin Uddin[3], Mohammad Mostafizur Rahman[4]

Abstract:

Introduction: *South Asia has one quarter of the global population, but about half of the population live below the poverty line and has limited access to health care. Bangladesh is in the midst of an epidemiologic transition where the burden of disease is shifting from a disease profile dominated by infectious diseases to non-communicable disease. In this regard Chest Disease Hospitals specially in tertiary level are playing important role because both infectious chest diseases including PTB, pneumonia, COVID 19 infection and non-communicable diseases like COPD, asthma, interstitial lung diseases are abundant among the general population.*

Aim of the study: *The aim of this survey is to determine patients' overall necessities which they expect from our hospital and to measure the level of satisfaction with quality of general services and specifically with staff attitude and hospital environment while receiving service in Outpatient department of tertiary level chest hospital like National Institute of Diseases of The Chest & Hospital (NIDCH), Mohakhali, Dhaka.*

Materials & Methodology: *This prospective cross-sectional study was conducted in Outpatient department, National Institute of the Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka, Bangladesh from February 2021 to June 2021. Data were entered, checked and analyzed by SPSS for windows version 20.0 and MS Excel-2016.*

Results: *This study was conducted among 357 patients. The mean age was 45.4±17.2 and the male female ratio was 1:0.5. Though NIDCH is situated in the city, 59.1% patient came from rural area and only 31.9% to came from urban area. Nearly half (49.6%) of the patients were from middle income society. Highest number (18.2%) was diagnosed as tuberculosis. Most common comorbid condition was DM (16.8%.). Most of the patients (56.9%) were satisfied with hospital OPD service.*

Conclusions: *Most of the participants advised to increase the service points to reduce waiting time. The effectiveness of health care may determine to the satisfaction of patients with the health service provided.*

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Introduction:

Bangladesh is a South Asian low-middle-income economy, has experienced a demographic and epidemiological transition with rapid urbanization and a gradual increase in life expectancy[1,2]. It is the seventh most populous country in the world and population of the country is expected to be nearly double by 2050[3]. The rising burden of non-communicable diseases (NCDs) in Bangladesh can be related to rapid urbanization, and nearly 50 percent of the country's slum dwellers live in Dhaka[4,5]. According to the 2018 Country Environmental Analysis (CEA) report of the World Bank, air pollution causes the deaths of 46,000 people in Bangladesh per year[6]. Less than 10% hospitals of this country follow the Medical Waste Management Policies[7]. In 2017, 26 incidents of disease outbreak were investigated by Institute of Epidemiology, Disease Control and Research (IEDCR)[8]. According to the World Health Organization, health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity[9,10]. So, health facility should be a place that strives to help patients return to health as defined.

To provide optimum health care facilities one should know the health care seeking pattern of the patients. In this regard age and sex distribution, habitat and economic status, smoking behavior pattern all are important. At the same time number of new, follow-up and referral patients, their chief complaints, preliminary diagnosis, their comorbidities, their required investigations and drugs and their ultimate requirement should be known to give specific management.

In recent years developing countries, influenced heavily by findings in developed countries, have become increasingly interested in assessing the quality of their health care. Outcomes of a health care have received special emphasis as a measure of quality[11,12]. Quality assessment studies usually measure an outcome with three types: medical outcomes, costs, and patients' satisfaction. For the last mentioned, patients are asked to assess not their own health status after receiving care but their satisfaction with the services delivered[13-15].

Patient satisfaction is the degree to which the patient's desired expectations, goals and or preferences are met by the health care provider and or service[16-18]. This satisfaction has gained recognition by measuring the quality-of-service delivery[19-21]. This recognition is not lost on the health sector as the necessity for constant enhancement of quality and safety in the delivery of patient care in healthcare facilities has become an accepted concept[22-24]. The observation and determination of patient satisfaction offers an indicator of the quality of care that considers the patients' perspectives[25-27]. Patients and their relatives have been recognized as the best source of information on the dignity and respect with which they are being treated[28,29]. Patient encounters often disclose how well a hospital system is working, offering insight into areas that need changes and providing useful information that assists management to close gaps between the way things are being run and the way things should be run[29].

Materials and Methodology:

Study design: Prospective Cross-sectional study

Place of study: Outpatient department, National Institute of the Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka, Bangladesh.

Period of study: 5 months (February–June 2021).

Study population: Patients suffering from chest diseases attending OPD of NIDCH for treatment.

Data collection tools: Structured questionnaire.

Sample size: 357 patients

Sampling method: Sample was collected by simple random sampling as per inclusion criteria.

Inclusion criteria:

1. Patients attending at the outpatient department of NIDCH after receiving registration number.
2. Those who gave consent to participate in the study.

Exclusion criteria:

1. Those who were unwilling to take part in the study.

Statistical analysis:

Data were analyzed by SPSS for windows version 20.0 and MS Excel-2016. Descriptive and inferential statistical analysis was carried out.

Ethical issue:

The protocol of the study was approved by the scientific committee of NIDCH. Informed written

consent was taken from all patients or his or her attendants after full explanation of the nature and purpose of all procedures which will be used for the study. As all the tests were noninvasive and non-harmful to the patients, there was no ethical barrier in fact.

Results:

This Prospective Cross-sectional study was conducted in outpatient department, National Institute of the Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka, Bangladesh.We did this study to observe the information regarding health care seeking pattern among the patients visiting the OPD of NIDCH and thus improving the health care services in OPD of NIDCH. For this we observe patients demographic characteristics (age, gender, living area, economic status, occupation type, smoking behavior), type of patients(referred, non-referred) clinical findings (symptoms, co-morbidities), laboratorial investigations,treatment strategies and examined the satisfaction level of the patients.

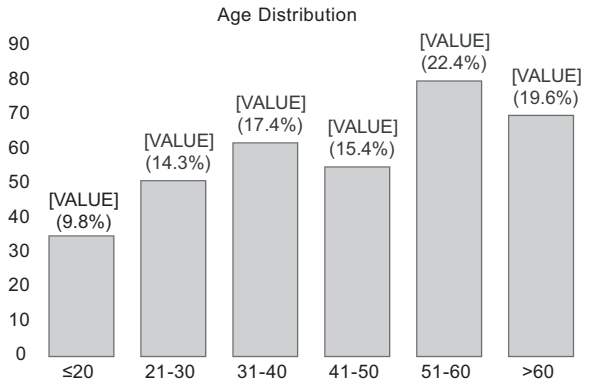

Fig.-1: *Distribution of the study people according to age (N=357)*

Figure-1 shows the age distribution of the study people. In this study, mean age of the study people was 45.4 years (SD± 17.2 years) ranged between 6-80 years. Most of the study people were in the age group of 51-60 years. Statistically insignificant age distribution followed.

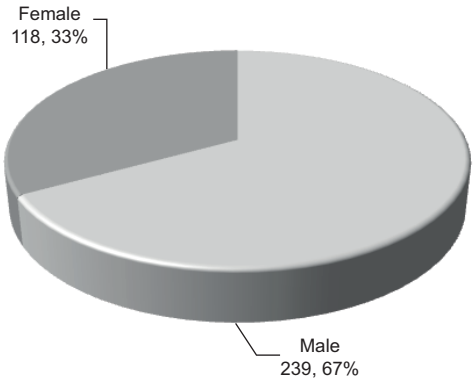

Fig.-2: *Gender distribution of the study people (N-357)*

Figure-2 shows the gender distribution of the study people. In this present study, most of the study people (66.9%) were male and the remaining 33.1% were female. Male female ratio was 1:0.5. P-Value was statistically highly significant (P<0.0001).

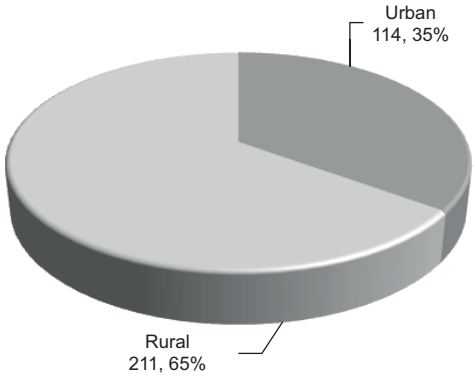

Fig.-3: *Residential identity of the study people. (n=357)*

Figure-3 In this study, most of the study people (59.1%) were from rural area and the remaining 31.9% were from urban area. P-Value was statistically highly significant (P<0.0001).

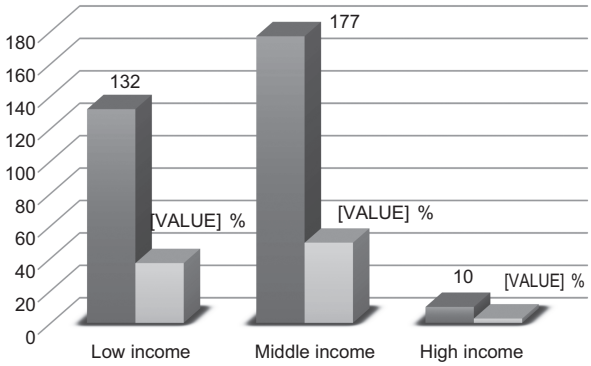

Fig.-4: *Economic status of the study people (N=357)*

Figure-4shows economic status of the study people. In this study, most of the study people (49.6%)

were from middle income family. Followed by, 37% were from low-income family and 2.8% were from high income family. P-Value was statistically highly significant (P<0.0001).

Table-I

Occupation of the study people. (n=357)

Occupation	Number of patients	Percentage
Farmer	59	16.5
Labor	49	13.7
Service	44	12.3
Business	56	15.7
Housewife	83	23.2
Student	55	15.4
Others	7	2.0

Table-1 shows the occupation of the study people. In this present study, most of the study people (23.2%) were housewife. Followed by, 16.5% were farmer, 15.7% were businessman, 15.4% were student, 13.7% were labor, 12.3% were service holder.

Table-II

Smoking behavior of the study people. (n=357)

Smoking behaviors	Number of patients	Percentage	P-Value
Non-smoker	174	48.7	<0.0001
Ex-smoker	92	25.8	
Smoker	88	24.6	

S«^{2}-value= 11.527, df=1, P-value=<0.0001

Table-III

Type of patients. (n=357)

Type of Patient		Number of patients	Percentage	P-Value
Types	New	251	70.3	<0.0001
	Follow-up Patient	51	14.3	
	Old	46	12.9	
If New-	Referred from other Hospital	42	16.7	<0.0001
	Referred from GP/Specialist	59	23.5	
	Self-Attended	150	59.8	0.0009

Table-IV

Symptom compelled to attend. (n=357)

Symptom compelled to attend	Number of patients	Percentage
Cough	222	62.2
Breathing Problem	182	51.0
Chest Pain	113	31.7
Fever	109	30.5
Hemoptysis	44	12.3
Epistaxis	11	3.1
Discharge from Lymph node	1	0.3
Productive Sputum	3	0.8

Table-V

Approximate Waiting time to consult. (n=357)

Approximate Waiting time to consult	Number of patients	Percentage	P-Value
<30 minutes	79	22.1	<0.0001
30 minutes to 1 hour	130	36.4	
1-2 hour	84	23.5	
>2 hours	17	4.8	

Table-II shows the smoking behavior of the study people. In this study, most of the study people (48.7%) were non-smoker. Followed by, 25.8% were ex-smoker and 24.6% were smoker. P-Value was statistically highly significant (P<0.0001).

Table-III shows the type of patients. In this study, most of the study people (70.3%) were new patient. Followed by, 14.3% were follow-up patient and 12.9% were old patient. Most of the new patients (59.8%) were self-attended. Followed by, 23.5% were referred from GP/Specialist and 16.7% were referred from hospital.

Table-IV shows the main symptom compelled to attend. In this study, the most common symptom among the study people was cough (62.2%). Followed by, 51% had breathing problem, 31.7% had chest pain, 30.5% had fever, 12.3% had hemoptysis, 3.1% had epistaxis, 0.8% had productive sputum and 0.3% had discharge from Lymphnode.

Table-V shows the approximate waiting time to consult. In this study, maximum (36.4%) approximate waiting time to consult of the study people was 30 minutes to 1 hour. Followed by, 23.5% waited 1-2 hours, 22.1% waited less than 30 minutes

Table-VI

Preliminary Diagnosis of the patient. (n=357)

Preliminary Diagnosis of the patient	Number of patients	Percentage
Asthma	57	16.0
COPD	42	11.8
RTI including Pneumonia	35	9.8
Tuberculosis	65	18.2
DPLD	4	1.1
Bronchiectasis	33	9.2
Malignancy	47	13.2
Pleural Effusion	35	9.8
Pneumothorax	6	1.7
Empyema Thoraces	24	6.7
COVID	5	1.4
Acute sinusitis	1	0.3
Aspergilloma	1	0.3
Lymphadenitis	1	0.3
ACOS	1	0.3
Destroyed left lung	2	0.6
Post TB Bronchiectasis	2	0.6
Others	2	0.6

Table-VII

Co-morbidities of the study people. (n=357)

Co-morbidities	Number of patients	Percentage
T2DM	60	16.8
HTN	53	14.8
CAD	5	1.4
CKD	12	3.4
CLD	1	0.3
Hypothyroid	1	0.3
Total	132	37

Table-VIII

Investigation suggested for the study people. (n=357)

Investigation Suggested	Number of patients	Percentage
X-chest PA view	286	80.1
Routine Blood Tests	254	71.1
Spirometry and other PFT	14	3.9
Sputum Examinations	164	45.9
CT Chest	78	21.8
Bronchoscopy/other Invasives	8	2.2
Fine Needle Aspiration	26	7.3
Biopsies	1	0.3
Lymph node aspirate for Gene expert	1	0.3
ECHO cardiogram	1	0.3
DST for mycobacteria	1	0.3

and 4.8% waited more than 2 hours. P-Value was statistically highly significant (P<0.0001).

Table-VI shows the preliminary diagnosis of the patient. In this study, most of the study people (18.2%) had tuberculosis. Followed by, 16% had asthma, 47% had malignancy, 11.8% had COPD, 9.8% had RTI including pneumonia, 9.8% had pleural effusion, 9.2% had bronchiectasis, 6.7% had empyema thoracic, 1.7% had pneumothorax, 1.4% had COVID-19, 1.1% had DPLD, 0.6% had destroyed left lung, 0.6% had post TB bronchiectasis, 0.3% had acute sinusitis, 0.3% had aspergilloma, 0.3% had lymphadenitis.

Table-VII shows the co-morbidities of the study people. In this present study, 37% of people (75 had co-morbidities. Followed by, 16.8% had T2DM, 14.8% had HTN, 3.4% had CKD, 1.4% had CAD, 0.3% had CLD and 0.3% had hypothyroidism.

Table-VIII shows the investigation suggested for the study people. In this present study, the most common (80.1%) suggested investigation for the study people was X-chest PA view. Followed by, 71.1% were suggested to do Routine Blood Tests, 45.9% were suggested to do Sputum Examinations, 21.8% were suggested to do CT Chest, 7.3% were suggested to do Fine Needle Aspiration, 3.9% were Spirometry and other PFT, 2.2% were suggested to do Bronchoscopy/ other Invasives, 0.3% were suggested to do Biopsies, 0.3% were suggested to do Pus for Gene expert, 0.3% were suggested to do ECHO cardiogram and 0.3% were suggested to do DST.

Table-IX

Treatment Given to the study people. (n=357)

Treatment Given	Number of patients	Percentage
Antibiotics	251	70.3
Bronchodilators	191	53.5
Steroids	100	28.0
Anti histamin	5	1.4
Vitamins	4	1.1
Anti ulcerant	2	0.6
ATT	50	14.0
RetreatmentATT	1	0.3

Table-X

Participant's advice to improve service here. (n=357)

Participant's advice to improve service here	Number of patients	Percentage
To increase service points	108	30.3
To improve HCWs	68	19.0
To increased space allocation	121	33.9
Investigation service	107	30.0
Medication service	91	25.5

Table-IX shows the treatment Given to the study people. In this present study, most of the study people (70.3%) were treated with Antibiotics. Followed by, 53.5% were treated with Bronchodilators, 28% were treated with Steroid, 14% were treated with ATT, 1.4% were treated with Anti histamine, 1.1% were treated with Vitamins, 0.6% were treated with Anti ulcerate and 0.3% were retreated.

The participants had given advice to improve service here (Table-14). Most of the participants (33.9%) advised to increased space allocation. Followed by, 30.3% advised to increase service points, 30% advised to improve investigation service, 25.5% advised to improve investigation service, 19% advised to improve HCWs.

Table-XI

Distribution of responses from the participants on hospital staffs and availability of service. (n=367)

Hospital Staffs and Availability of Service		Number of patients	Percentage
Behavior of medical staffs	Excellent	154	43.1
	Good	189	52.9
	Bad	14	3.9
Quality of outdoor waiting arrangement	Excellent	121	33.9
	Good	200	56.0
	Bad	36	10.1
Waiting time for doctors	Excellent	100	28.0
	Good	221	61.9
	Bad	29	8.1
	Not mentioned	7	2.0
Experience on availability of medicine as per prescription	Excellent	121	33.9
	Good	196	54.9
	Bad	36	10.1
	Not mentioned	4	1.1

Table-XII

Distribution of responses from the participants regarding Clinical Care. (n=357)

Clinical Care		Number of patients	Percentage
Doctors' attention towards patient while taking the history	Excellent	171	47.9
	Good	175	49.0
	Bad	11	3.1
Examination time given to the patient by the doctors	Excellent	125	35.0
	Good	218	61.1
	Bad	11	3.1
Quality to make the patients clear about his problems by the doctors	Excellent	4	1.1
	Good	129	36.1
	Bad	214	59.9
	Not-mentioned	14	3.9
Quality in explaining the patients about medicine & dose by doctors	Excellent	121	33.9
	Good	225	63.0
	Bad	11	3.1
By the doctors during clinical examination Quality of privacy maintenance	Excellent	121	33.9
	Good	225	63.0
	Bad	7	2.0
	Not-mentioned	4	1.1

Table-XIII

Distribution of responses as per the opinion related to hospital utility service. (n=357)

Hospital Utility Services		Number of patients	Percentage
Opinion on overall hospital cleanness	Excellent	161	45.1
	Good	189	52.9
	Bad	7	2.0
Opinion on accessibility to hospital department	Excellent	154	43.1
	Good	186	52.1
	Bad	18	5.0
Response on overall hospital management and helping facilities	Excellent	136	38.1
	Good	203	56.9
	Bad	14	3.9
	Not-mentioned	4	1.1

Table-XI shows the distribution of responses from the participants on hospital staffs and availability of service. According to most of the participants (52.9%), the behavior of medical staffs was good. According 43.1% participants, the behavior of medical staffs was excellent and according to 3.9% participants, the behavior of medical staffs was bad. According to most of the participants (56%), the quality of outdoor waiting arrangement was good. According to 33.9% participants, the quality of outdoor waiting arrangement was excellent and according to 10.1% participants, the quality of outdoor waiting arrangement was bad. According to most of the participants (61.9%), waiting time for doctors was good. According to 28% participants, the waiting time for doctors was excellent and according to 8.1% participants, the waiting time for doctors was bad. According to most of the participants (54.9%), the experience on availability of medicine as per prescription was good. According to 33.9% participants, the experience on availability of medicine as per prescription was excellent and according to 10.1% participants, the experience on availability of medicine as per prescription was bad.

Table-12 shows the distribution of responses from the participants regarding Clinical Care. According to most of the participants (49%), the doctors' attention towards patient while taking the history was good. According to 47.9% participants, the doctors' attention towards patient while taking the history was excellent and according to 3.1% participants, the doctors' attention towards patient while taking the history was bad. According to most of the participants (61.1%), the examination time given to the patient by the doctors was good. According to 35% participants, the examination time given to the patient by the doctors was excellent and according to 3.1% participants, the examination time given to the patient by the doctors was bad. According to most of the participants (59.9%), the quality to make the patients clear about his problems by the doctors was bad. According to 36.1% participants, the quality to make the patients clear about his problems by the doctors was good and according to 1.1% participants, the quality to make the patients clear about his problems by the doctors was bad. According to most of the participants (63%), the quality in explaining the patients about medicine & dose by doctors was good. According to 33.9% participants, the quality in explaining the patients about medicine & dose by doctors was excellent and according to 3.1% participants, the quality in explaining the patients about medicine & dose by doctors was bad. According to most of the participants (63%), the quality of privacy maintenance by the doctors during clinical examination was good. According to 33.9% participants, the quality of privacy maintenance by the doctors during clinical examination was excellent and according to 2% participants, the quality of privacy maintenance by the doctors during clinical examination was bad.

Table-XIII shows the distribution of responses as per the opinion related to hospital utility service. The most common opinion (52.9%) of the participant on overall hospital cleanness was good. According to 45.1% of the study people, the overall hospital

cleanness was excellent and according to 2% of the study people, the overall hospital cleanness was bad. The most common opinion (52.1%) of the participant on accessibility to hospital department was good. According to 43.1% of the study people, the accessibility to hospital department was excellent and according to 5% of the study people, the accessibility to hospital department was bad. The most common response (56.9%) of the participant on overall hospital management and helping facilities was good. According to 38.1% of the study people, the overall hospital management and helping facilities was excellent and according to 3.9% of the study people, the overall hospital management and helping facilities was bad.

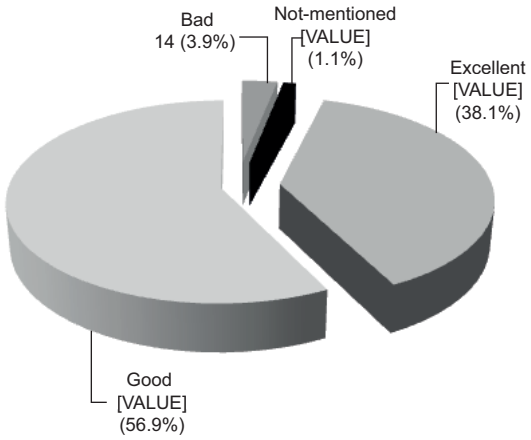

Fig.-5: *Distribution of satisfaction judgment about overall hospital OPD services. (n=357)*

In this study, the most common (56.9%) the satisfaction judgment of the study people about overall hospital OPD services was good. 38.1% had excellent satisfaction judgment about overall hospital OPD services, 3.9% had bad judgment about overall hospital OPD services and 1.1% had not given any judgment about overall hospital OPD services.

Discussion:

This Prospective Cross-sectional study was conducted in outpatient department, National Institute of the Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka, Bangladesh. We did this study to observe the information regarding health care seeking patternamong the patients who are visiting the OPD of NIDCH and thus improving the health care services in OPD of NIDCH. For this we observe patients demographic characteristics, clinical findings, laboratorial investigations, treatment strategies and examined the satisfaction level of the patients.

In this study, mean age of the study people was 45.4 years (SD± 17.2 years) ranged between 6-80 years. Most of the study people were in the age group of 51-60 years. A study of Akter R et al. found maximum patients in between 16-45 years of age[30]. Another study of Stefanovska VV et al found by observing the mean age of the patients was 49±15.12 with 18-80 age range[30]. No matter what the age is, but patients can take service from the out patients department.

In this present study, most of the study people (66.9%) were male and the remaining 33.1% were female. Male female ratio was 1:0.5. Habibullah S et al. studied in Pakistan on the adult patients attending in OPDs[64]. On that study about 54% patients found male. Stefanovska VV et al found 61% male patients which is similar to our study[31].

About most of the study people (59.1%) were from rural area and the remaining 31.9% were from urban area. This happen may due to the hospital located near the city bus stand. The rural people who come in the city to get health services, they feel easy access here. Mane V et al. found 88.7% rural patients and the rest was from urban because of the location[32].

Most of the study people (49.6%) were from middle income family. Then, 37% were from low-income family and 2.8% were from high income family. According to Mane V et al. majority of the patients 422 (41.8%) belonged to lower middle class and the least number 53 (5.3%) belonged to upper class[33].

In this present study, most of the study people (23.2%) were housewife. Followed by, 16.5% were farmer, 15.7% were businessman, 15.4% were student, 13.7% were labor, 12.3% were service holder, 0.8% were retired, 0.6% were unemployed, 0.3% hawker and 0.3% were barber. Unemployed people were not so much but Stefanovska VV et al found about half 50.8% unemployed study people[63]. Another study conducted in Nizeria, majority of the study patients were civil servants (47.6%), those engaged in business/trading (27.1%) and unemployed/students (25.3%)[34]. As maximum patients were from rural area so, majority were farmer and businessman. According to the smoking behavior, there most of the study people (48.7%)

were non-smoker. Followed by, 25.8% were ex-smoker and 24.6% were smoker.

In the department of OPD different type of patients came for service. Of them, about (70.3%) were new patient. Followed by, 14.3% were follow-up patient and 12.9% were old patient. Most of the new patients (59.8%) were self-attended. Followed by, 23.5% were referred from GP/Specialist and 16.7% were referred from hospital. In the study of Stefanovska VV et al 22.3% was new patients, 9.6% patients come for the second time and 68.1% was follow-up patients[63].

The most common symptom among the study people was cough (62.2%). Followed by, 51% had breathing problem, 31.7% had chest pain, 30.5% had fever, 12.3% had hemoptysis, 3.1% had epistaxis, 0.8% had productive sputum and 0.3% had pus from LN. From the study of Akter R et al. the most common diseases were DM affecting 55(11%), HTN was 2nd common disease 51(10.2%) in her study[62]. Another study depicted that the most common symptom for OPD consultations made were for musculoskeletal complaints 16.14% like easy fatigability followed by fever 15.25%, headache 12.09%, and acute respiratory infections 8.91%[67]. Mane V et al. found majority 7.82% had abdomen pain, knee pain in 6.14% cough/cold in 54 (5.35%), fever in 3.17% chest pain in 1.88% of patients[33]. From the findings of Khan et al, the most common symptoms among the patients were related to indigestion/excess gas formation[34].

The approximate waiting time to consult found in this study, majority (36.4%) approximate waiting time to consult of the study people was 30 minutes to 1 hour. Followed by, 23.5% waited 1-2 hours, 22.1% waited less than 30 minutes and 4.8% waited more than 2 hours.

After the preliminary diagnosis of the patient, we found in this study, most of the study people (18.2%) had tuberculosis. Followed by, 16% had asthma, 47% had malignancy, 11.8% had COPD, 9.8% had RTI including pneumonia, 9.8% had pleural effusion, 9.2% had bronchiectasis, 6.7% had empyema thoracic, 1.7% had pneumothorax, 1.4% had COVID-19, 1.1% had DPLD, 0.6% had destroyed left lung, 0.6% had post TB bronchiectasis, 0.3% had acute sinusitis, 0.3% hadaspergilloma, 0.3% had lymphadenitis, 0.3% had ACOS, 0.3% had chronic organ and 0.3% had catamonial.

The co-morbidities of the study people were presented in this study, most of the study people (75.6%) had no co-morbidities. Followed by, 16.8% had T2DM, 14.8% had HTN, 3.4% had CKD, 1.4% ha CAD, 0.3% had CLD and 0.3% had hypothymid.

The investigation suggested for the study people in this present study, the most common (80.1%) suggested investigation for the study people was X-chest PA view. Followed by, 71.1% were suggested to do Routine Blood Tests, 45.9% were suggested to do Sputum Examinations, 21.8% were suggested to do CT Chest, 7.3% were suggested to do Fine Needle Aspiration, 3.9% were Spirometry and other PFT, 2.2% were suggested to do Bronchoscopy/other Invasives, 0.3% were suggested to do Biopsies, 0.3% were suggested to do Pus for Gene expert, 0.3% were suggested to do ECHO cardiogram and 0.3% were suggested to do DST.

The treatment given to the study people in this study, most of the study people (70.3%) were treated with Antibiotics. Followed by, 53.5% were treated with Bronchodilators, 28% were treated with Steroid, 14% were treated with ATT, 1.4% were treated with Anti histamin, 1.1% were treated with Vitamins, 0.6% were treated with Anti ulcerant and 0.3% were retreated.

The participants had given advice to improve service here. Most of the participants (33.9%) advised to increased space allocation. Followed by, 30.3% advised to increase service points, 30% advised to improve investigation service, 25.5% advised to improve investigation service, 19% advised to improve HCWs.

The distribution of responses from the participants on hospital staffs and availability of service. Most of the participants (52.9%), the behavior of medical staffs was good. 43.1% participants stated the behavior of medical staffs was excellent and some 3.9% participants commented that the behavior of medical staffs was bad. Polite and courteous behaviour of the hospital staffs is very necessary for hospital out patients department services. Training of hospital staffs and in particular the civilian staffs might have positive impact towards higher satisfaction level. Pawar[69] found 90% of the respondents remarked that OPD services were satisfactory.

According to most of the participants (56%), the quality of outdoor waiting arrangement was good, 33.9% participants, the quality of outdoor waiting arrangement was excellent and 10.1% participants, the quality of outdoor waiting arrangement was bad. According to most of the participants (61.9%), waiting time for doctors was good. According to 28% participants, the waiting time for doctors was excellent and according to 8.1% participants, the waiting time for doctors was bad. As waiting times become inevitable, there need to supply waiting rooms with television sets, newspaper, magazine and adequate sanitary facilities to reduce the monotony of waiting[35].

According to most of the participants (54.9%), the experience on availability of medicine as per prescription was good. According to 33.9% participants, the experience on availability of medicine as per prescription was excellent and according to 10.1% participants, the experience on availability of medicine as per prescription was bad.

The distribution of responses from the participants regarding Clinical Care, according to most of the participants (49%), the doctors' attention towards patient while taking the history was good. According to 47.9% participants, the doctors' attention towards patient while taking the history was excellent and according to 3.1% participants, the doctors' attention towards patient while taking the history was bad. According to most of the participants (61.1%), the examination time given to the patient by the doctors was good. According to 35% participants, the examination time given to the patient by the doctors was excellent and according to 3.1% participants, the examination time given to the patient by the doctors was bad. According to most of the participants (59.9%), the quality to make the patients clear about his problems by the doctors was bad. According to 36.1% participants, the quality to make the patients clear about his problems by the doctors was good and according to 1.1% participants, the quality to make the patients clear about his problems by the doctors was bad. According to most of the participants (63%), the quality in explaining the patients about medicine & dose by doctors was good. According to 33.9% participants, the quality in explaining the patients about medicine & dose by doctors was excellent and according to 3.1% participants, the quality in explaining the patients about medicine & dose by doctors was bad. According to most of the participants (63%), the quality of privacy maintenance by the doctors during clinical examination was good. According to 33.9% participants, the quality of privacy maintenance by the doctors during clinical examination was excellent and according to 2% participants, the quality of privacy maintenance by the doctors during clinical examination was bad. One study shows that more than 86% of outdoor patients and 73% of indoor patients went directly to the medical college hospital without being referred from any other facility or doctor. The reported consultation time with the doctor was one minute or less for 29% of patients and more than five minutes for only 10% of patients[36]. In some studies, doctors' treatment, behaviour, and long waiting time for consultation with doctors came out as major contributing factors to patient dissatisfaction in Bangladesh[37-39]. According to findings of the present study, the following items were found to be the main antecedents of patient's satisfaction with doctors' medical care in Bangladesh: (1) doctors should ask detailed questions about patients' problems; (2) doctors must listen carefully to their problems; (3) The behaviour of the doctor should good and friendly; (4) doctors must follow up treatments; and (5) patients' trust in doctors' treatment[40].

As per the opinion related to hospital utility service, the most common opinion (52.9%) of the participant on overall hospital cleanness was good. According to 45.1% of the study people, the overall hospital cleanness was excellent and according to 2% of the study people, the overall hospital cleanness was bad. The most common opinion (52.1%) of the participant on accessibility to hospital ward/department was good. According to 43.1% of the study people, the accessibility to hospital ward/department was excellent and according to 5% of the study people, the accessibility to hospital ward/department was bad. The most common response (51%) of the participant on hospital cafeteria facilities for patients' services was good. According to 31.9% of the study people, the hospital cafeteria facilities for patients' services was excellent and according to 16% of the study people, the hospital cafeteria facilities for patients' services was bad. The most common response (56.9%) of the participant on overall hospital management and helping facilities was good.

According to 38.1% of the study people, the overall hospital management and helping facilities was excellent and according to 3.9% of the study people, the overall hospital management and helping facilities was bad. Panda PS et al found in his study that the highest satisfaction of patients towards infrastructure services was with service of separate place for examination while the lowest satisfaction was with the water and sanitation facilities which was mainly due to overcrowding and lack of cleaning staff[41]. SK Jawahar[42] found that 50% of the patients were satisfied with the cleanliness of a super specialty hospital in India. Krupal Joshi[43] found in Gujrat that, patients were fully satisfied regarding hospital cleanliness.

More than half (56.9%) of the patients had satisfaction on the overall services of the hospital. 38.1% had excellent satisfaction judgment about overall hospital OPD services, 3.9% had bad judgment about overall hospital OPD services and 1.1% had not given any judgment about overall hospital OPD services. Similar status found in other literatures also[44-45].

Conclusions & Recommendations:

Health care seeking pattern of the patients will help the authority of NIDCH to improve the health facilities. A good number of information have been collected by analyzing the data. Most of the patients (59.1%) received treatment in OPD are from rural area. The common groups of patient were suffering from tuberculosis 18.2%, asthma 16%, COPD 11.8% and malignancy 13.2%. So the authorities should give more emphasis regarding management of these groups of patient.About 38.1% patients were highly satisfied and more than half of the patients were satisfied with the services provided in the out-patient department of NIDCH in Mohakhali, Dhaka. Still there 3.9% people who are not satisfied with the services. The effectiveness of health care may determine to the satisfaction of patients with the health service provided.This type of study should be performed in each institute and hospital in regular interval. The findings of the study may help the practitioners, stuff, and hospital authority to know various neglected areas of the consultation. Continuous monitoring may need to assess the degree of sustainable improvement. It is recommended that a future study with a larger scope to improve the quality and outcome of such studies.

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ORIGINAL ARTICLE

Radiological Involvement among Asymptomatic and Symptomatic COVID-19 Patients - A Cross-Sectional Study

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Abstract:

Background and aims: *The COVID-19 pandemic is a current problem across the world. Evaluation of the radiological involvement is helpful for early detection of the COVID-19 cases, even when RT-PCR is negative. As RT-PCR is a time-consuming procedure, have high false negative rate, and requires a special laboratory set-up, radiological findings can be used for early detection and proper management of the suspected cases. The aim of this study was to evaluate the radiological involvement (HRCT & chest X-Ray) among asymptomatic and symptomatic COVID-19 patients*

Methods: *This cross-sectional study was conducted among suspected and confirmed COVID-19 patients visited at the outpatient department or admitted to the National Institute of the Diseases of the Chest and Hospital (NIDCH), Dhaka, Bangladesh within the period of April 15, 2020 and June 5, 2020. Chest X-Ray and high-resolution computed tomography scan (HRCT) of the chest was done as well as RT-PCR of nasopharyngeal swab for SARS-CoV-2. Sensitivity, Specificity, PPV and accuracy of HRCT and RT-PCR was evaluated.*

Results: *Total 53 cases were enrolled in the study. The mean age was 47.4 years with male predominant (52.8%). RT-PCR was positive in 64.2% cases. Ground glass opacity (GGO) with consolidation was the most common (50.9%) HRCT pattern and the left lower lobe was most commonly involved (60.4%). In chest X-Ray, consolidation was the most common finding (22.6%) followed by GGO (20.8%). HRCT has high sensitivity (73.33%) and specificity (75.0%) in detecting parenchymal abnormality following SARS-CoV-2 infection.*

Conclusion: *Chest X-ray and HRCT can play an important role in the early detection of COVID-19 suspected cases for starting treatment early.*

Key words: *COVID-19, HRCT, radiological involvement, RT-PCR, SARS-CoV-2*

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Introduction:

The novel corona virus or COVID-19 which is also known as SARS-CoV-2 is a current pandemic across the world. Like other viruses, SARS-CoV-2 infects lung alveolar epithelial cells using receptor mediated endocytosis via the angiotensin converting enzyme II (ACE2) as an entry receptor.[1] COVID-19 was declared pandemic by World Health Organization (WHO) on 11th March 2020 following its outbreak as a cluster of pneumonia cases with unknown cause in Wuhan City, Hubei Province, China, in December 2019.[2] Coronaviruses were first described in 1966 by Tyrell and Bynoe, who cultivated the viruses from patients with common colds.[3] The initial clinical sign of the SARS-CoV-2 related disease COVID-19 which allowed case detection was pneumonia. More recent reports also describe gastrointestinal symptoms and asymptomatic infections, especially among young children.[4] Observations so far suggest a mean incubation period of five days and a median incubation period of 3 days (range: 0–24 days).[5] The proportion of individuals infected by SARS-CoV-2 who remain asymptomatic throughout the course of infection has not yet been definitely assessed. In symptomatic patients, the most common clinical symptoms are fever and cough in addition to other nonspecific symptoms including dyspnea, headache, muscle soreness, and fatigue.[6] About 20% of cases are severe, and mortality is approximately 3%.[7] The infection can progress to severe disease with dyspnoea and severe chest symptoms corresponding to pneumonia in approximately 75% of patients, as seen by computed tomography on admission.[5] The patients suspected with corona virus symptoms are firstly tested for reverse transcriptase polymerase chain reaction (RT-PCR), which is time consuming. Meanwhile, to assess the condition of the patient, HRCT (High-Resolution Computerized Tomography) and chest X-Ray may be done. The time delay for the results of nasopharyngeal RT-PCR, sampling site/collection errors, lower sensitivity as compared to CT scan and invasive nature of sampling apart from social reasons, pitches HRCT thorax as a possible alternative to RT-PCR as a screening modality especially in symptomatic cases.[8] CT is important in the diagnosis and treatment of lung diseases. Small preliminary evidence suggests that early use of CT scan may be more efficacious in differentiating COVID-19 from other pulmonary infections based on "classical" COVID-19 specific findings on CT scan.[9] Being a non-invasive modality with rapid test results, high sensitivity, low risk of cross infection, good reproducibility for analysis as compared to RT-PCR, make chest CT worth evaluating as a primary screening modality. HRCT chest is indicated for moderate, severe cases & follow up of patient. In Bangladesh, COVID-19 has also made a great impact. At the time of writing this report, total 954,881 cases are registered along with 15,229 deaths.[10] This study was conducted to assess the radiological involvement (HRCT & Chest X-Ray) among asymptomatic and symptomatic COVID-19 patients.

Objectives:

This study was conducted to assess the radiological involvement (HRCT & chest X-Ray) among asymptomatic and symptomatic COVID-19 patients. We also assessed the sensitivity and specificity of CT compared to RT-PCR for the diagnosis of COVID-19 pneumonia.

Methodology & Materials:

This cross-sectional study was conducted among patients attended to the outpatient and inpatient department of the National Institute of Diseases of the Chest and Hospital (NIDCH), Dhaka, Bangladesh within the period between 15 April, 2020 and 5 June, 2020. Total 53 patients were enrolled purposefully according to the following inclusion and exclusion criteria.

The inclusion criteria:

- The patients with a suspicion of COVID-19 disease (positive contact history, but no symptom at presentation).
- Symptomatic patients, who needed admission.

The exclusion criteria:

- The patients who were mentality unstable were excluded from this study.
- The patients who were not interested in sharing their experience, medical records or opinion related to this study.

The measurement of oxygen saturation, thermal screening, and RT-PCR from nasopharyngeal swab was done. Chest X-ray was advised initially. If the chest X-ray findings were suggestive of COVID pneumonia, the patient underwent HRCT chest depending upon the severity of disease for more

accurate staging and CT severity scores in Radiology Department. Follow up of HRCT chest was advised for severe grade and critical patients. Clinical information, hematological parameters, and radiological findings (HRCT and chest X-Ray) were collected with written consent from the patients or guardian of the patients. Besides, all patients detail history were collected from the hospital's record keeping authority accepting all the terms and conditions. CIOMS guidelines were maintained during the research processes. This study was approved by the ethical committee of the National Institute of Diseases of the Chest and Hospital (NIDCH), Dhaka, Bangladesh. Unpaired z- test was used as a test of significance; with p value < 0.05 was taken to be significant. Standard formulae were used and statistical analysis of the result was obtained by using windows-based computer software devised with Statistical Package for Social Science (SPSS-22) and Microsoft Excel 2007.

Results:

More than half of the patients were within the age group of 31-50 years and a fairly large group of patients (20.75%) were above 60 years with the mean age 47.4±14.5 years. Most of the patients (52.8%) were male and came from urban area (86.8%) [Table-I]. Majority of the patients (64.2%) were tested positive RT-PCR for SARS-CoV-2 [Figure-1]. Fever was the most common presenting complaint (79.2%), followed by cough (66%). Most of the cases (83%) had normal finding on chest auscultation [Table–2]. Diabetes was the most common co-morbidity (32.1%), followed by hypertension (28.3%) and asthma (15.1%) [Table-III]. We observed that more than half of the patients (50.9%) had ground glass opacity (GGO) with consolidation in HRCT, whereas 17% patients had thickened vessel. Lower lobes of both lungs were most commonly involved, left lower lobe and right lower lobe was involved in 60.4% and 52.8% cases respectively. In 39.6% cases, there was peripheral involvement and in 24.5% cases there was diffuse disease [Table-IV]. Similar findings were seen in chest X-Ray, where consolidation was found in 22.6% cases and GGO in 20.8% cases [Table-V]. Sensitivity and specificity of HRCT in detecting parenchymal abnormality following SARS-CoV-2 infection was 73.33% and 75.0% and that of RT-PCR 67.27% and 56.25% respectively. Positive likelihood ratio of HRCT was 2.93% and that of RT-PCR 1.77%. Positive predictive value of HRCT was 98.24% and RT-PCR 86.11%. HRCT was found more accurate (98.65%) than RT-PCR (75.47%) in detecting disease [Table-VI].

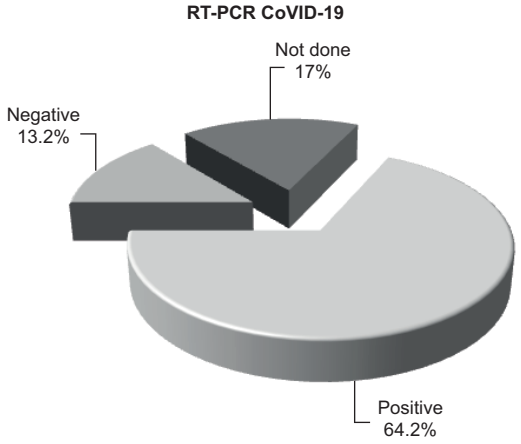

Fig.-1: *RT-PCR findings of the study people. (n=53)*

Table-I

Sociodemographic characteristics of the study people. (n=53)

Characteristics		Frequency	%
Age (year)	≤20	2	3.8
	21-30	3	5.7
	31-40	12	22.6
	41-50	17	32.1
	51-60	8	15.1
	>60	11	20.75
	Mean± SD	47.4±14.5	
	Range	17-80	
Sex	Male	28	52.8
	Female	25	47.17
Occupation	Businessman	10	18.87
	House wife	12	22.64
	Student	5	9.43
	Service	26	49.06
Residence	Urban	46	86.8
	Rural	7	13.2

Table-II

Clinical Profile of the study people. (n=53)

Parameters		Frequency	%
Symptoms	Fever (>100^0 F)	42	79.2
	Cough	35	66.0
	Dyspnoea	15	28.3
	Chest pain	2	3.8
	Flu-like symptoms	5	9.4
	Diarrhea	1	1.9
	Anosmia	6	11.3
	Ageusia	2	3.8
	Body ache	4	7.5
	Hypothyroidism	1	1.9
Auscultatory findings	Wheeze	2	3.8
	Crepitation	7	13.2
	Diminished breathe sound	0	0.0
	Normal	44	83.0

Table-III

Co-morbidities of the study people. (n=53)

Co-morbidities	Frequency	%
DM	17	32.1
Hypertension	15	28.3
IHD	1	1.9
CKD	1	1.9
COPD	2	3.8
Asthma	8	15.1
Bronchiectasis	1	1.9
IGT	1	1.9

Table-IV

*HRCT findings of the study people. (n=53)**

HRCT findings		Frequency	%
HRCT pattern	GGO	10	18.9
	GGO with consolidation	27	50.9
	Reverse halo sign	1	1.9
	Crazy paving pattern	3	5.7
	Thickened vessels	9	17.0
	Reticular and reticulonodular pattern	1	1.9
	Sub-pleural band	2	3.8
	Pleural calcification/ thickening	2	3.8
	Septal thickening	1	1.9
Frequency of lobar involvement	RUL	17	32.1
	RML	19	35.8
	RLL	28	52.8
	LUL	17	32.1
	LLL	32	60.4
Distribution of involvement	Central	0	0.0
	Peripheral	21	39.6
	Diffuse	13	24.5

*Total number may be more than 53, as a patient may have multiple radiological findings and involvement

Table-V

Chest X-Ray findings of the study people. (n=37)

X-Ray findings	Frequency	%
Consolidation	12	22.6
GGO	11	20.8
Patchy opacity	5	9.4
Right sided pulmonary inflammatory	3	5.7
Inflammatory change	2	3.8
Fibrosis	2	3.8
Pleural calcification thickening	2	3.8

Table-VI

Sensitivity, Specificity and Accuracy status of HRCT and RT-PCR

	HRCT	RT-PCR
Sensitivity	73.33%	67.27%
Specificity	75.00%	56.25%
Positive Likelihood Ratio	2.93%	1.77%
Disease prevalence	98%	98%
Positive predictive value	98.24%	86.11%
Accuracy	98.65%	75.47%

Discussion:

In our study, it was found that mean age of the study people was 47.4 years (SD ±14.5), ranged between 17-80 years. Maximum study people (32.1%) were in the age group of 41-50 years. Most of them (52.8%) were male and living in urban area (86.8%). Similar results were found in the study of Kulshrestha V. et al.[11], where among 250 patients, majority (31.2%) were in the age group of 41-50. In the study of Shi H. et al.[12] among 81 study people, majority were male (52%). RT-PCR findings shows that maximum (64.2%) study people had positive result, 13.2% were negative and in 17% cases RT-PCR was not done. Most of the study people (79.2%) had fever (>100^0 F), followed by cough (66%), dyspnoea (28.3%), anosmia (11.3%), flu-like symptoms (9.4%), body ache (7.5%), chest pain (3.8%), ageusia (3.8%), and diarrhea (1.9%). In another study of Inui S. et al.[13] among 104 patients, 11% had fever, 19% had cough, 2% sore throat, 10% had fatigue, 3% had dyspnea, 4% had nasal discharge, 5% had headache, and 2% had diarrhea. Most of the patients (83%) in our study had normal auscultatory findings, 13.2% had crepitation and 3.8% had wheeze. We found that most of the study people (32.1%) had diabetes followed by hypertension (28.3%), asthma (15.1%), COPD (3.8%), IHD (1.9%), CKD (1.9%), bronchiectasis (1.9%) and IGT (1.9%). In another study of Sharma K. et al.[14] among 376 study people, 41% had HTN, 17% had DM, 11% had COPD, and 6% had IHD.

From our study it was revealed that GGO with consolidation was the most common HRCT pattern (50.9%), followed by GGO (18.9%), thickened vessel (17%), crazy paving pattern (5.7%), sub-pleural band (3.8%), pleural thickening (3.8%), reticular and reticulonodular pattern (1.9%), reverse halo sign (1.9%) and septal thickening (1.9%). In their study, Shah SA and co-workers[15] found that among 216 cases, GGO in 92.2%, both GGO's & consolidation in 9.8%, GGO's with septal thickening/crazy paving pattern in 54%, GGO's with reversed halo or Atoll sign in 17.7%, GGO's with pulmonary nodules in 28.4%, mediastinal lymphadenopathy in 16.7%, fibrosis, traction bronchiectasis, volume loss, calcified granulomas in 7.8% study people. We observed that 1.9% patients had single lobe involvement, 11.3% had 2 lobes, 5.7% had 3 lobes, 9.4% had 4 lobes, and 17.0% had 5 lobes involvement. Shah SA. et al.[15] seen in their study that among 216 patients single lobe involvement in 7 cases, 2 lobe involvement in 31 cases, 3 lobe involvement in 18 cases, 4 lobe involvement in 19 cases, and 5 lobe involvement in 27 cases. We also observed that left lower lobe was most commonly involved (60.4%) followed by right lower lobe (52.8%), right middle lobe (35.8%), and right upper lobe (32.1%) and left upper lobe (32.1%). Peripheral involvement was seen in 39.6% and diffuse involvement was seen in 24.5% cases. Alam SZ. et al.[16] in their study observed that among 128 patients, right lower lobe involvement in 93.75%, left lower lobe involvement in 91.41%, right upper lobe involvement in 87.50%, left upper lobe involvement in 85.94% and right middle lobe involvement in 75.0%, peripheral disease 45.31% and diffuse disease in 50.78% cases. Mean CT severity score of our study was 26.5 (SD± 22.2).

We observed various patterns in chest X-Ray. Consolidation was the most common finding (22.6%). Others had GGO (20.8%), patchy opacity (9.4%), inflammatory change (5.7%), fibrosis (3.8%) and pleural thickening (3.8%). Kulshrestha V. et al.[11] seen that among 250 study people, early GGO in

33.2%, GGO in 46%, consolidation in 26.4%, reticulation in 20.4%, crazy-paving in 10%, pleural thickening in 17.6%, pleural effusion in 10%, lymphadenopathy in 7.6%, nodular lesion in 11.6% and cystic airspace in 4.4% study people.

It was noted that HRCT is a valuable and dependable diagnostic modality in detecting lung parenchymal abnormality and indirectly detecting COVID-19 infection. Sensitivity and specificity of HRCT in detecting parenchymal abnormality following SARS-CoV-2 infection was 73.33% and 75.0%. Though detection of SARS-CoV-2 viral RNA by RT-PCR is gold standard for diagnosis of infection, it has high false negative results. We found that sensitivity and specificity of RT-PCR is 67.27% and 56.25% respectively in detecting COVID-19 disease. Positive likelihood ratio of HRCT was 2.93% and that of RT-PCR 1.77%. Positive predictive value of HRCT was 98.24% and RT-PCR 86.11%. HRCT was found more accurate (98.65%) than RT-PCR (75.47%) in detecting disease. Our observations well match with the findings of other studies.[8,17]

Limitations of the Study:

Sample size was not sufficiently enough to make a firm conclusion. It was a single center study. So, the findings of this study may not reflect the exact scenario of the whole country. Study duration and follow up period were short. Further study is required to have better understanding.

Conclusion and Recommendations:

The most common pattern of COVID-19 on HRCT images are pure GGO, GGO with consolidation and thickened vessels. In the chest X-Ray, consolidation and GGO was most commonly found. HRCT and chest X-Ray play a vital role in the early clinical detection and diagnosis of COVID-19, and can be considered as a diagnostic modality. Chest X-ray may play an initial screening tool in case detection whereas HRCT chest may be recommended for detection of suspected cases where RT-PCR is negative, and for determination of disease severity.

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ORIGINAL ARTICLE

Association of Serum D-dimer Level with Acute Exacerbation of Chronic Obstructive Pulmonary Disease (AECOPD)

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Abstract:

Background: *Chronic obstructive pulmonary disease (COPD) is a major global health problem and is often associated with systemic inflammation. D-dimer level, an end product of degradation of cross-linked fibrin by plasmin, have been shown in some studies to be increased in patients with COPD exacerbation. But still, there is a debate regarding the diagnostic efficiency of D-dimers tests in COPD exacerbation patients. Therefore, this study is aimed to find the association of D-dimer with acute exacerbation of COPD.*

Methods*: This was a cross-sectional study conducted at the National Institute of Diseases of the Chest and Hospital (NIDCH) from March 2020 to February 2021. A total of 90 patients with a confirmed diagnosis of COPD were included after screening in according to the inclusion and exclusion criteria. Following informed written consent, physical examination, relevant investigations were done for all patients. In all cases, ethical issues and health issues were maintained properly and collected data were analysed by SPSS 16.*

Results: *Among 90 COPD patients, mean age of the study population was 56.24±11.24 (SD) years with a majority in age group 51-60 years (50%). Male-female distribution was 97%-male vs 3%-female. Overall frequency of higher D-dimer level was 57.8%. Higher serum D-dimer level was observed in AECOPD patients ($p<0.05$). Increased serum D-Dimer level was also significantly associated with increased $PaCO_2$ and decreased P_{aO2}. In multivariate analysis, PaCO2 (>45 mmHg) and serum D-Dimer (>0.5 pg /ml) were found to be independent predictors for severe exacerbation of chronic obstructive pulmonary disease.*

Conclusion:*There is association between serum D-dimer level with acute exacerbation of COPD patients.*

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Introduction:

Chronic obstructive pulmonary disease (COPD) is a global health concern that contributes significantly to mortality and morbidity.[1]In Bangladesh, pooled COPD prevalence among Bangladeshi adult was 12.5%. It is anticipated that COPD will be the third leading cause of global death by 2030, and almost all (90%) of the deaths caused by COPD occurred in low and middle-income countries.[2]Acute exacerbations in COPD are episodes of worsening of respiratory

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symptoms that cause physiological changes and associated with an increase in the airway and systemic inflammation that needs further treatment.The frequency and severity of exacerbation are the most important factors determining the overall prognosis in COPD. Hence, accurate individual risk assessment during an exacerbation is essential for clinical management and rational allocation of medical resources. Consequently, reliable predictors for in-hospital mortality, which are easily obtained upon admission, namely biomarkers, are urgently needed.[3] The biomarker D-dimer is often linked with COPD. The mechanisms behind this could be COPD being a chronic inflammatory state leading to hypercoagulability, and it causes other systematic inflammations and the increased chances of venous thrombo-embolism, causing a pulmonary embolism. D-dimer has been seen to increase in COPD patients than controls and rises more in acute exacerbations.The association of D-dimer with acute COPD may help indicatethe severity and prognosis, but it is still controversial. With the high prevalence of COPD, an easily available biomarker such as D-dimer could help triage these patients leading to proper patient and hospital management. Therefore, this study aimed to determine whether D-dimer levels obtained upon admission in patients with AECOPD correlates with both in-hospital mortality and long-term prognosis.

Materials and Methods:

This wasa cross-sectional study and was conducted at the National Institute of Diseases of the Chest and Hospital (NIDCH) from March 2020 to February 2021. A total of 90 patients with a confirmed diagnosis of COPD included after screening in according to the inclusion and exclusion criteria. Following informed written consent, physical examination, relevant investigations were done for all patients.

General objectives:

To determine the association of serum D-dimer level with acute exacerbation of COPD patients

Specific objectives:

- To measure serum D-dimer in AECOPD patients
- To establish the relationship between AECOPD with serum D-dimer level
- To determine the association of serum D-dimer level with arterial blood gas and SpO2 in AE COPD

Selection Criteria:

Inclusion criteria:

- All patients admitted to the in-patient department of NIDCH, diagnosed as a case of AE-COPD based on: at least 2 of the three following symptoms:
- Age>40 years
- Sex- both male and female
- Patient willing to participate in this study

Exclusion criteria:

- Patients who are laboratory confirmation (RT-PCR) of COVID-19 infection
- Other Known acute respiratory infections
- Patient any coagulation disorder, previous history of venous thromboembolism,haematological disorder
- Receiving current anticoagulation treatment
- Patient with any malignancy.

Results:

Mean age of the study population was 56.24±11.24 (SD) years with majority in age group 51-60 years (50%) with male predominance (97%).[Table-I]. Among total population 70% were smoker and 30% were non-smoker. [Figure-1].Serum D-Dimer level was significantly associated with PaO2 and PaCO2 ($p<0.05$).[Table-IV]. Increased serum D-Dimer level was also significantly associated with increased PaCO2 and decreased PaO2 [Table-VI]. Serum D-dimer level with PaO2 in AE COPD patients were significantly associated ($r= -0.745$, $p(<0.001)$[Figure-2]. Serum D-Dimer level had a positive correlation with PaCO2 level ($r=0.835$ and <0.001)[Figure-3].Serum D-dimer level with pH in AE COPD patients were significantly associated ($r= -0.510$, $p<0.001$) that means pH level decreases with increased serum D-dimer level.[Figure-4].Serum D-dimer level with Spo2 in AE COPD patients were significantly associated ($r=-0.651$, $p<0.001$) that means Spo2 level decreases with increased serum D-dimer level.[Figure-5].In multivariate analysis, PaCO2 (>45 mmHg) and serum D-Dimer (>0.5 pg / ml) were found to be independent predictors for severe exacerbation of chronic obstructive pulmonary disease. [Table-IX].

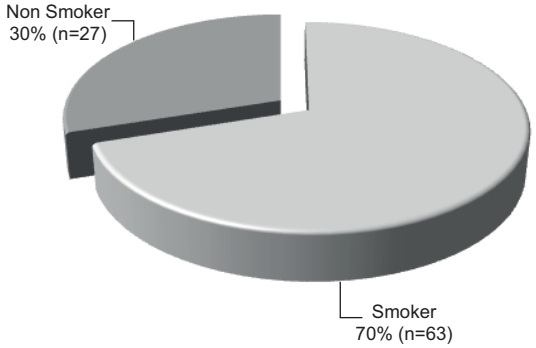

Fig.-1: *Distribution of patients according to presence of smoking (n=90)*

Table-I

Demographic characteristics of the study patients (n=90)

Demographic characteristics	Frequency(n)	Percentage
Age (years)		
41-50	24	26.7
51-60	45	50.0
61-70	13	14.4
>70	8	8.9
Mean±SD	56.24	±11.24
Gender		
Male	87	96.7
Female	3	3.3
BMI (kg/m^2)		
Underweight	2	2.2
Normal	49	54.4
Overweight	37	41.1
Obese	2	2.2
Mean±SD	24.1	±1.66

Table-II

Co morbidities among the patients of acute exacerbation of COPD (n=90).

Co morbidities	Frequency(n)	Percentage
Diabetes mellitus		
Present	15	16.7
Absent	75	83.3
Hypertension		
Present	23	25.6
Absent	67	74.4

Among the respondents 16.7% had diabetes mellitus and 25.6% had hypertension.

Table-III

Distribution of patients of AECOPD patients according to hospital ward (n=90).

Hospital Unit	Gender		Total
	Male	Female	
Indoor ward	56(62.2)	2(2.2)	58(64.4)
Respiratory Care Unit	31(34.4)	1(1.1)	32(35.6)
Total	87(96.6)	3(3.3)	90(100)

Table-IV

Laboratory investigations among acute exacerbation of Chronic obstructive pulmonary disease patients (n=90)

Investigation profile	Mean±SD
White blood cell count ($\times 10^9$/L)	11.84±4.35
Lymphocyte ($\times 10^9$/L)	4.04±2.23
Neutrophil count ($\times 10^9$/L)	6.64±2.54
$PaCO_2$ (mm Hg)	51.8±10.1
PaO_2 (mm Hg)	53.4±9.97
pH	7.17±0.28
Spo_2 (%)	90.7±2.6
C-reactive protein (mg/L)	14.5±5.95
Serum D-Dimer level (pg /ml)	1.09±0.66

Table-V

Investigations profile among AECOPDpatients (n=90)

Investigation profile		Frequency (n)	Percentage (%)
Serum D-Dimer level (pg/ml)	<0.5	38	42.2
	>0.5	52	57.8
PaO_2 (mmHg)	>60	34	37.8
	<60	56	62.2
$PaCO_2$ (mmHg)	>50	55	61.1
	<50	35	38.9

Table-VI

Types of exacerbationamong AECOPD patients (n=90)

COPD Stages	Frequency (n)	Percentage (%)
Type 1- Mild exacerbation	8	8.9
Type 2 - Moderate exacerbation	31	34.4
Type 3 - Severe exacerbation	51	56.6

Table-VII

Association of serum D-dimer level with PaO_2 in AE COPD patients (n=90)

Serum D-Dimer level (pg/ml)	PaO_2 (mmHg)		P value
	>60	<60	
<0.5	34	4	0.001
>0.5	0	52	

*P value was determined by Chi-square Test (χ^2)

Table-VIII

Association of serum D-dimer level with paCO2 in AE COPD patients (n=90)

Serum D-Dimer level (pg/ml)	$PaCO_2$ (mm Hg)		P value
	>50	<50	
<0.5	4	34	0.001
>0.5	51	1	

*P value was determined by Chi-square Test (χ^2)

Table-IX

Association of Types of exacerbation of COPD with serum D-Dimer, PaO_2,$PaCO_2$, pH, Spo_2 level among AECOPD patients (n=90)

Variable	Types of exacerbation of COPD			P value
	Mild exacerbation	Moderate exacerbation	Severe exacerbation	
Serum D-Dimer level (pg/ml)	0.4±0.3	1.1±0.2*$	1.8±0.7*$*µ	*<0.001$
PaO_2 (mmHg)	62.5±7.2	46.5±4.8*β	45.2±4.7	*<0.001$
$PaCO_2$ þ(mmHg)	42.4±7.4	58.8±5.1*γ	57.2±3.3	*<0.001$
pH	7.50±0.28	7.26±0.23*&	7.06±0.25	*<0.001$
Spo_2 (%)	93.4±3.4	92.5±2.3	89.2±1.4*^	*<0.001$

*P value was determined by One way ANOVA test. Post-Hoc analysis by Bonferroni method done. *â and *ã Significantly low in comparison to mild group vs moderate group, *$ Significantly low in comparison to mild group vs moderate group,*$*µin comparison to moderate group vs severe group,*&Significantly low in comparison to mild group vs moderate group and *^Significantly low in comparison to moderate group vs severe group.

Table-X

Multivariable regression analysis for severe exacerbation of COPD

	Adjusted OR	95% CI		P value
		Lower	Upper	
Smoker	0.321	0.017	6.134	0.450ns
Diabetes mellitus	0.010	0.002	1.897	0.998ns
Hypertension	2.398	0.049	17.068	0.659ns
$PaCO_2$ (>45 mmHg)	51.941	1.011	68.733	0.049s
PaO_2 (<60 mmHg)	0.468	0.004	60.952	0.760ns
pH (<7.35 or >7.45)	4.240	0.364	49.335	0.249ns
Spo_2 (<96 %)	2.419	0.005	37.245	0.781ns
Serum D-Dimer level (>0.5 pg /ml)	25.523	1.469	43.456	0.026s

s= significant, ns= not significant
p-value reached from multivariate analysis by binary logistic regression analysis
OR=Odd's Ratio

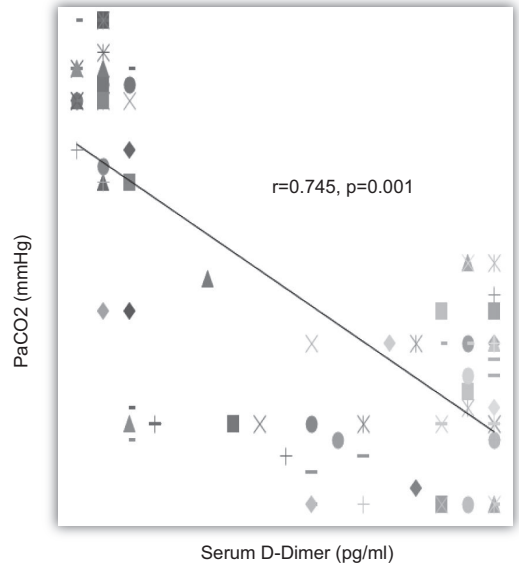

Fig.-2: *Correlation between serum D-dimer level with PaO_2 in AE COPD*

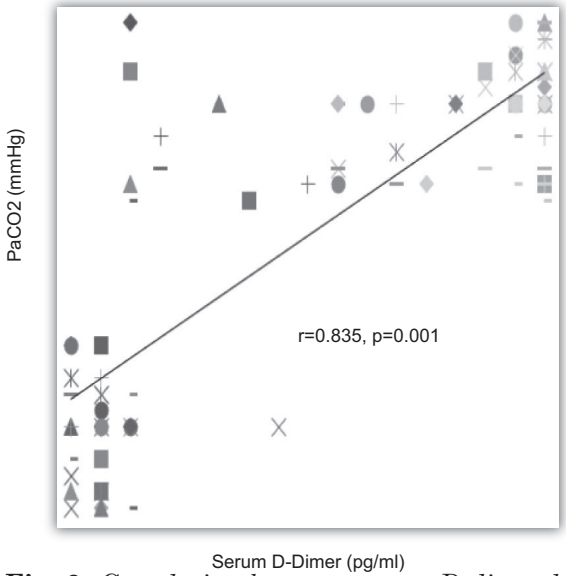

Fig.-3: *Correlation between serum D-dimer level with PaCO2 in AE COPD patients (n=90)*

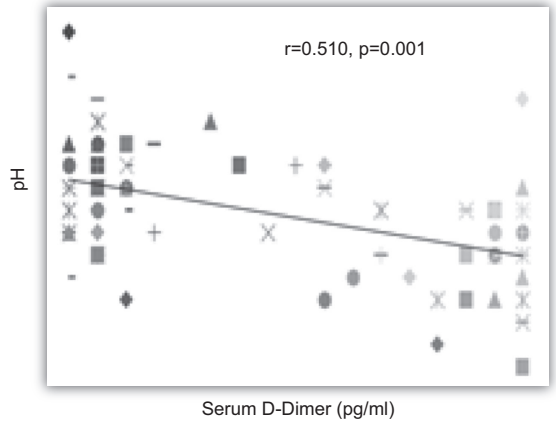

Fig.-4: *Correlation between serum D-dimer level with p^H in AE COPD patients (n=90)*

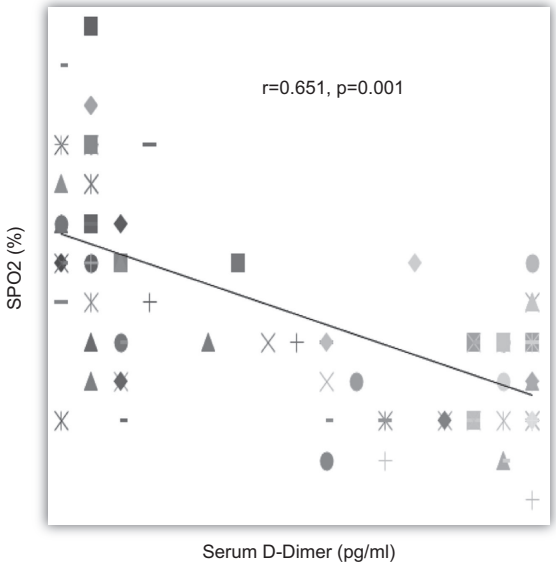

Fig.-5: *Correlation between serum D-dimer level with Spo_2 in AE COPD patients (n=90)*

Discussion:

Majority of respondents belonged to the age group 50-60years (50%) and followed in decreasing order by 41-50 years (26.7%), 61-70years (14.4%) and >70years (8.9%). Mean age was 56.24±11.24 years. In Rashid et al.[4] study, most of the patients of acute exacerbation of COPD (AECOPD) (56%) in the age group 55-65 years which corresponds with the recent study.

According to the study, among the respondent majority BMI were within normal limit followed in decreased order by 41.1% were overweight, 2.2% were underweight and 2.2% were obese. The mean body mass index was 24.1±1.66(SD) kg/m^2. Moreover, among the respondents 16.7% had diabetes mellitus and 25.6% had hypertension.In Hersh et al.[5] study, family history of COPD may contribute to nearly 20% of the risk of COPD in the population. Subjects with a parental history of COPD had more severe disease, with lower lung function, exercise capacity, and quality of life. In Ajit et al.[6] study, they found DM was present in 23.05% in patients with acute exacerbation of COPD which corresponds with the current study. They also found acute exacerbations were seen more in diabetics than non-diabetics with a significant difference.In Assal and Kamal study, the mean BMI was 23.54±6.42 (SD) kg/$m^2$and they also found with the severity of the obstruction (GOLD staging) BMI of the patient decreases, and it was statistically significant.

In this study, the most common features acute exacerbation of COPD was cough (96.7%) followed in decreasing order by dyspnea (91.1%), sputum (87.8%), fatigue (73.3%), fever (16.7%) and accessory muscle use (11.1%). Majority had crepitation (87.8%) followed in decreasing order by wheezing (42.2%) and cyanosis (33.3%) as clinical signs. In Mohan et al.[8] study they found that, common symptoms of acute exacerbation of COPD were cough, sputum production, fatigue, fever and accessory muscle and among them cough and sputum production were most common clinical feature which similar to our result also. Furthermore, the most common signs we found in COPD patients were crepitation (90.7%) followed by wheezing (40.7%) and cyanosis (34.9%) which corresponds with this study findings.

In this study, among the patients of acute exacerbation of chronic obstructive pulmonary disease majority 56.6% were in type 3 – severe exacerbation followed in decreasing order by 34.4% were in type 2 – moderateexacerbation, 8.9% were in type 1-mild exacerbationby types of exacerbation of COPD.Wong et al.[9] study, more than 85% of admissions had the severity of COPD equal to or greater type 3 which corresponds with the study results.

According to this study, among the respondents, the white blood cell count was 11.84±4.35 (SD) $\times 10^9$/ L, lymphocyte count was 4.04±2.23 (SD) $\times 10^9$/L, neutrophil count was 6.64±2.54 (SD) $\times 10^9$/L, $PaCO_2$was 51.8±10.1 (SD) mm Hg, PaO_2 was 53.4±9.97 (SD) mm Hg, pH level 7.17±0.28 (SD), Spo_2 (%) 90.7±2.6 (SD), C-reactive protein was 14.5±5.95(SD) mg/L, serum D-Dimer level was 1.09±0.66 (SD)pg /ml.Moreover, 57.8% had serum D-Dimer level >0.5pg /ml, 62.2% had PaO_2 <60 mmHg, 61.1% had $PaCO_2$>50 mmHg. In Taylan et al.[10] study, they found inflammatory markers, such as WBC, CRP, neutrophil, lymphocyte and ESR were found to be significantly elevated in exacerbated COPD compared to stable COPD and control participants. Cukic[11] study, in patients with COPD there is the decrease of PaO2 and increase of $PaCO_2$ level, and there was a statistically significant decrease of PaO2 ($p<0.01$) and an increase of PaCO2 ($p<0.01$) during in patients with acute exacerbation of COPD which corresponds with recurrent study. According to Akpinar et al.[12] study, the mean D-dimer level of the patients was 1.56±2.18 pg/mL in ÿþpatients with COPD exacerbation.

In this study,serum D-Dimer levelwas significantly associated with PaO_2 and $PaCO_2$ ($p<0.05$). Serum D-dimer level with PaO_2 in AE COPD patients were significantly associated ($r= -0.745$, $p<0.001$) that means PaO_2level decreases with increased serum D-dimer level and Serum D-Dimer level increased when $PaCO_2$was increased. Serum D-Dimer level had a positive correlation with $PaCO_2$ level (r=0.835 and <0.001). That means serum D-Dimerlevel increases along with $PaCO_2$level. Serum D-dimer level with p^H in AE COPD patients were significantly associated ($r= -0.510$, $p<0.001$) that means $p_H$level decreases with increasedserum D-dimer level.Serum D-dimer level with SpO_2in AE COPD patients were significantly associated ($r=-0.651$, $p<0.001$) that means SpO_2level decreases with increasedserum D-dimer level.Moreover, thetypes of exacerbation COPD were significantly associated with serum D-Dimer level, PaO_2, $PaCO_2$, pH and Spo_2. The serum D-Dimer level and $PaCO_2$increased with increasing the stage of COPD. The PaO_2 decreased with increasing the stage of COPD. The pH and SpO_2 decreased with increasing the stage of COPD.In Mohan et al.[8] study, they also found that the level of PaO_2 and $PaCO_2$ significantly associated with the stage of COPD by Gold criteria. PaO_2 decreased and $PaCO_2$ increased with increasing the severity of the disease. According to Ishikawa et al.[13] study, elevated serum D-dimer is associated with the risk of developing acute exacerbation.In Hu et al.[14] study, they found serum D-dimer was a risk predictor both for in- hospital and 1-year mortality of AECOPD patients Moreoverserum D-dimer level increased with the severity of the disease which corresponds with the study.

Conclusion:

There is association between serum D-dimer level with acute exacerbation of COPD patients.Further studies with larger sample size are recommended. Further study can be done to establish predictive value of serum d-dimer level in AECOPD.This study may be carried on other hospital.

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ORIGINAL ARTICLE

Electrolyte Abnormalities in Hospitalized COVID-19 Patients: An Observational Study

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Abstract:

Background: *Coronavirus disease 2019 (COVID-19) is a potentially fatal disease with multisystem involvement. Electrolyte abnormalities are not uncommon in coronavirus disease 2019 (COVID-19). Several studies have suggested that various electrolyte imbalances seem to have an impact on disease prognosis.*

Objective: *The primary objective of the present study was to evaluate the pattern of electrolyte abnormalities in hospitalized COVID-19 patients.*

Methods: *This retrospective study was conducted in the Department of Respiratory Medicine, National Institute of Diseases of the Chest & Hospital, Mohakhali, Dhaka, between January 2021 and June 2021. A total of 51 patients with COVID-19 were included in the study. Baseline levels of sodium, potassium, calcium and chloride were assessed and the effects of abnormalities in these electrolytes were evaluated. Patients demographic profile, clinical features, admission electrolyte report were documented in case record forms. Collected data were compiled and appropriate analyses were done by using computer based software. Chi-squre test was used to analyse the categorical variaties. A p-value <0.05 was considered significant.*

Results: *In this study, total 51 hospitalized COVID-19 patients were included in the study. Majority (41.2%) patients belonged to age group 61 to 80 years with mean age 56.3±17.7 years. Two third (66.7%) patients were male with male to female ratio 2:1. Majority (31.4%) of the patients had hypertension followed by diabetes mellitus 29.4%, 23.5% had IHD, 15.7% had COPD and 35.3% were smoker. Most commonly electrolyte abnormality was hyponatraemia (56.9%) followed by hypokalemia (41.2%). Hyponatraemia was significantly higher in severe COVID-19 patient group.*

Conclusion: *In this study, we found that, Hyponatraemia was the most predominant electrolyte abnormality. Hyponatraemia is a sign of unfavourable prognosis in COVID-19 and baseline electrolyte assessment, even after hospitalization, would be beneficial to assess the risk for severe COVID-19.*

Key words: *COVID-19, Electrolyte abnormalities.*

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Introduction:

Since reported in late December 2019 from the Hubei province in China, coronavirus disease 2019 (COVID-19) has spread worldwide.[1] The World Health Organization (WHO) declared COVID-19 a pandemic in mid-March 2020. Clinical presentation of COVID-19 infection is wide, from asymptomatic infection to severe viral pneumonia with acute respiratory distress syndrome (ARDS).[2-4] More than three-quarters of hospitalized individuals with COVID-19 had some renal involvement during the course of the disease.[5] Most frequent forms of renal involvement in COVID-19 are acute kidney injury, proteinuria, haematuria and electrolyte imbalances,[5,6] In a meta-analysis, lower concentrations of sodium, potassium and calcium were related to severe disease; but none of the studies included primarily evaluated the status of electrolyte imbalances and its effect on both survival and disease severity.[6] ACE2, one of the key enzymes in the renin–angiotensin system (RAS), plays a significant role in regulating fluid and electrolyte balance.[7]. In a study including one hundred seventy-five COVID-19 patients, 18% were classified as having severe hypokalemia, 37% had hypokalemia, and 46% had normokalemia.[8] Water excretion may also be disturbed in Coronavirus infection[9], and hyponatremia has been reported in COVID-19 patients in a clinical case and in a small study in the United States.[10,11] Hyponatremia and hypokalemia were reported in a series of 12 patients in China.[12] Moreno et al.[13] described 306 COVID-19 patients in Spain with potassium measured in the first 72 h of admission. They found that hypokalemia was independently associated with requiring invasive mechanical ventilation, but mortality was not influenced by low potassium. There is a study, regarding hypocalcaemia which shows it is commonly occurred in severe COVID-19 patients and it was associated with poor outcome.[14] Different electrolytes imbalance, may have important implications on management and outcome of critically ill COVID-19 patients. Earlier pool analyses suggested that electrolyte abnormalities can be a common finding in Covid-19 patients that can be an obstacle in managing these patients. So, in this study we evaluateD the pattern of electrolyte abnorrmalities in hospitalized patients due to COVID-19 to broaden our understanding of the underlying cause of electrolyte disturbances in these patients.

Materials and methods:

This retrospective study was conducted in the Department of Respiratory Medicine, National Institute of Diseases of the Chest & Hospital, Mohakhali, Dhaka, between Jan 2021 and June 2021. Admission data of total 51 cases of RT-PCR positive COVID-19 patients were enrolled in this study. We collected patient demographic features (age, sex), comorbidities, history of COVID related symptoms, treatment protocol and electrolyte values including sodium, potassium and chloride were measured by ion-selective method (Auto analyzer). Other biochemical parameters including Hb, ESR, WBC, neutrophil, lymphocyte, RBS, serum creatinine, D-dimer and C-reactive protein (CRP) was also collected. The level of electrolytes were classified as normal, hypo or hyper according to laboratory reference range. Collected data were compiled and appropriate analyses were done by using computer based software. Qualitative variables were expressed in percentage. Chi-Square test was done to analyze the categorical variables, shown with cross tabulation. P value <0.05 was considered as statistically significant.

Results:

Among 51 hospitalized COVID-19 patients, majority 16(41.2%) belonged to age 61 to 80 years with mean age 56.3±17.7 years. Two third (66.7%) patients were male with male to female ratio 2:1 (Table-1). Regarding co-morbidities majority 16 (31.4%) patients had hypertension followed by 15(29.4%) had diabetes mellitus, 12(23.5%) had IHD, 8(15.7%) had COPD (Table-2). Smoker was found in 18(35.3%) (Table-3). Mean Hb was found 10.6±2.0 g/dl, ESR 46.7±22.2 mm/hr, WBC 12.8±5.4 10^9/L, neutrophil 72.9±13.4 percent, lymphocyte 20.7±10.2 percent, RBS 9.0±4.3 mmol/L, serum creatinine 1.16±0.36 mg/dL, CRP 33.1±46.9 mg/l and D-Dimer 2.1±2.0 gm/dl (Table-4). More than one third (35.3%) patients moderate of severity COVID-19 (Figure 1). Regarding electrolyte imbalance, majority 29(56.9%) patients had hyponatraemia, followed by 21(41.2%) hypokalemia, 5(9.8%) hyperchloremia, 5(9.8%) hyperkalemia and 3(5.9%) hypochloremia (Table-5). Thirteen (76.5%) patients were found hyponatraemic in severe COVID-19 group and 16(47.1%) in non severe COVID-19 group which was statistically significant (p<0.05) between two groups (Table-6).

Table-I

Demographic characteristics of the study patients (n=51)

	Frequency	Percentage
Age (years)		
21-40	9	17.6
41-60	18	35.3
61-80	21	41.2
>80	3	5.9
Mean±SD	56.3±17.7	
Range (min-max)	21.0-90.0	
Sex		
Male	34	66.7
Female	17	33.3

Table-II

Co-morbidity of the study patients (n=51)

Co-morbidity	Frequency	Percentage
Hypertension	16	31.4
Diabetes mellitus	15	29.4
IHD	12	23.5
COPD	8	15.7
TB	3	5.9
Asthma	3	5.9
CKD	2	3.9
CLD	1	2.0
Malignancy	1	2.0

Table-III

Smoking status of the study patients (n=51)

Smoking status	Frequency	Percentage
Yes	18	35.3
No	33	64.7

Table-IV

Hematological profile of the study patients (n=51)

Investigations	Mean	±SD
Hb (g/dl)	10.6	±2.0
ESR (mm/hr)	46.7	±22.2
WBC (10^9/L)	12.8	±5.4
Neutrophil (%)	72.9	±13.4
Lymphocyte (%)	20.7	±10.2
RBS (mmol/L)	9.0	±4.3
Serum creatinine (mg/dL)	1.16	±0.36
CRP (mg/l)	33.1	±46.9
D-Dimer (gm/dl)	2.	1±2.0

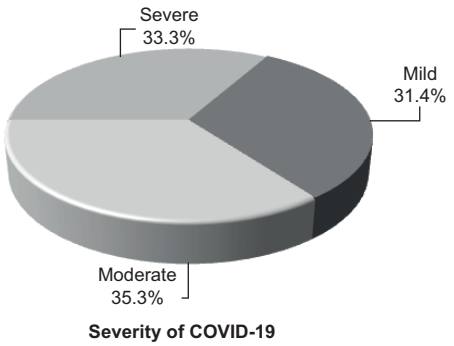

Fig.-1: *Pie chart showing severity of COVID-19 of the study patients (n=51)*

Table-V

Electrolyte imbalance of the study patients (n=51)

Electrolyte imbalance	Frequency	Percentage
Sodium		
Hyponatraemia (<135 mmol/L)	29	56.9
Normal (135-145 mmol/L)	22	43.1
Potassium		
Hypokalemia (<3.5 mmol/L)	21	41.2
Normal (3.5-5.0 mmol/L)	24	47.1
Hyperkalemia (>5.0 mmol/L)	5	9.8
Chloride		
Hypochloremia (<100 mmol/L)	3	5.9
Normal (100-108 mmol/L)	43	84.3
Hyperchloremia (>108 mmol/L)	5	9.8

Table-VI

Association between electrolyte imbalance with severity of COVID-19

Electrolyte imbalance	Severity of COVID-19		P value
	Severe(n=17)	Non Severe(n=34)	
Sodium			
Hyponatraemia	13 (76.5%)	16 (47.1%)	0.046[s]
Normal	4 (23.5%)	18 (52.9%)	
Potassium			
Hypokalemia	8 (47.1%)	13 (38.2%)	
Normal	8 (47.1%)	16 (47.1%)	0.741[ns]
Hyperkalemia	1 (5.9%)	4 (11.8%)	
Chloride			
Hypochloremia	1 (5.9%)	2 (5.9%)	
Normal	15 (88.2%)	28 (82.4%)	0.800[ns]
Hyperchloremia	1 (5.9%)	4 (11.8%)	

s= significant; ns= not significant

P value reached from chi square test

Discussion

Studies on COVID-19 confirm electrolyte disturbances in patients, including sodium, potassium, chlorine, and calcium imbalances.[2,15] One of the most common electrolyte disorders is hyponatremia, which occurs with a heightened risk of mortality in hospitalized patients.[16] Some drugs previously used in the United States Food and Drug Administration's (FDA) treatment protocol for patients with COVID- 19, such as chloroquine and hydroxychloroquine, can cause electrolyte imbalance.[17]

In this study among 51 patients with COVID-19 majority 21(41.2%) patients belonged to age 61 to 80 years with mean age 56.3±17.7 years. In a study conducted by Sultana et al.[18] reported that mean age was 62.9±13.3 years. Tezcan et al.[19] described that mean age was 54.3±16.3 years. Guan et al.[15] observed that the median age was 47.0 years. Another study done by Zhou et al.[20] showed the median age of the 191 COVID patients was 56.0 years, that was almost similar with your study.

We found that male patients were predominant 34(66.7%) with male, female ratio was 2:1. De Carvalho et al.[21] had observed that 56% patients were male and 44% were female. Sultana et al.[18] demonstrated that 58.57% patients were male and 41.42% were female. Liu et al.[22] described that 51.8% were male. Guan et al.[15] also observed that males were more likely to be infected than females (58.1% male and 41.9% female) that was support with my study.

Regarding co-morbidity in this study we observed that majority 16(31.4%) patients had hypertension followed by 15(29.4%) had diabetes mellitus, 12(23.5%) had IHD, 8(15.7%) had COPD, 3(5.9%) had TB, 3(5.9%) had asthma, 2(3.9%) had CKD, 1(2.0%) had CLD and 1(2.0%) had malignancy. In a study done by Tezcan et al.[19] reported that 31.9% patients had hypertension followed by 23.5% had diabetes mellitus, 10.5% had coronary arterial disease, 3.2% had COPD, 7.8% had asthma, 3.9% had malignancy, 2.6% had obesity, 3.2% had chronic renal disease and 3.2% had rheumatic diseases. Malieckal et al.[23] described patients with these types of abnormalities had underlying conditions like diabetes, hypertension and coronary artery disease, which may have contributed. De Carvalho et al.[21] showed 40.7% patients had hypertension followed by 20.2% had diabetes mellitus, 8.6% had CKD, 14.1% had CHF and 1.3% had liver cirrhosis. Zhou et al.[20] demonstrated that 91(48%) patients had a comorbidity, with hypertension being the most common 58(30%) patients followed by diabetes 36 (19%) and coronary heart disease 15 (8%) patients. Hu et al.[24] also found diabetes mellitus and hypertension were the main co morbidities related to disease severity and mortality, in their study.

This study showed 18(35.3%) patients were smoker. In a study conducted by Zhou et al.[20] reported 11(6%) were current smoker.

We found mean Hb was found 10.6±2.0 g/dl, ESR was 46.7±22.2 mm/hr, WBC was 12.8±5.4 10^9/L, neutrophil was 72.9±13.4 percent, lymphocyte was 20.7±10.2 percent, RBS was 9.0±4.3 mmol/L, serum creatinine was 1.16±0.36 mg/dL, CRP was 33.1±46.9 mg/l and D-Dimer was 2.1±2.0 gm/dl. Zhou et al.[20] had observed median WBC was 6.2 10^9/L followed by lymphocyte count was 1.0 10^9/L and D-Dimer was 0.8 µg/ml.

We observed that majority (56.9%) patients had hyponatraemia, followed by 21(41.2%) was hypokalemia, 5(9.8%) was hyperchloremia, 5(9.8%) was hyperkalemia and 3(5.9%) was hypochloremia. Malieckal et al.[23] found hyponatremia was the most commonly identified disorder (37.5%) followed by hypochloremia (26.0%) and hypocalcemia (18.3%). In Turkey, in a study on 408 patients hospitalized with COVID-19 showed those with hyponatremia, hypochloremia and hypocalcemia had worse outcomes. Sultana et al.[18] In their study they delayed with critically ill COVID patients total 82.85% (n= 58) had different electrolytes abnormalities and only 17.14% (n=12) had normal electrolytes level during admission period. Here most frequent electrolyte imbalance was hyponatraemia 77.1% followed by hypokalaemia 50.0%, hypocalcemia 28.6%, hypomagnesaemia 15.7%, hypermagnesaemia 7.14%. Tezcan et al.[19] showed that 228 (55.8%) of the patients had an electrolyte abnormality at baseline. Hyponatraemia was the most frequent baseline electrolyte abnormality 146 (35.8%).Thirty-nine (9.5%) had hypocalcaemia, and hypokalaemia and hypochloraemia were found in 28 (6.8%) patients each. Lastly, seven (1.7%) of the participants had hyperkalaemia. Duan et al.[25] found that sodium, potassium and chloride levels had high predictive power for COVID-19 progressing to severe disease. Liu et al.[22] described that hypernatremia, hyponatremia, hyperkalemia, hypermagnesemia, hypocalcemia, and hypoalbuminemia were significantly more common in hospitalized patients with COVID-19. Rostami et al.[26] described the most common electrolyte imbalance observed in patients was hyponatremia (42%), followed by hypomagnesemia (35%). Another case-control study showed that hyponatremia, hypokalemia, and hypochloremia, which are electrolyte disturbances, were more common in COVID-19 patients than in controls.[21] Hypocalcemia is also one of the electrolyte disorders in patients with COVID-19, which can be dangerous if not controlled and can even increase the mortality rate.[27] In the US, Aggarwal et al.[11] reported that among 19 patients with COVID-19 infection admitted to the emergency department, 50% presented with hyponatremia.

The present study showed that 13(76.5%) patients had hyponatraemia in severe COVID-19 group and 16(47.1%) in non severe COVID-19 group, which was statistically significant ($p<0.05$) between two groups. Lippi et al.[6] reported that sodium and potassium were significantly lower in patients with severe COVID-19 patients. Previous meta-analyses have reported associations of hypocalcemia and hyponatremia with COVID-19 severity.[28, 29]

There were some limitations of the study. First, we evaluated only a limited number of electrolyte influences on disease prognosis. Furthermore, we did not assess the aetiology of the electrolyte abnormalities. Only hospitalized individuals were included in the study. Therefore, the data did not represent all COVID-19 patients. Lastly, as the study was of a retrospective and observational design, we evaluated only the baseline electrolyte levels. As a result, the data did not show the effect of subsequent electrolyte abnormalities developed during hospitalization on outcome.

Conclusion:

In this study, we found that hyponatraemia was the most predominant electrolyte abnormality. Baseline electrolyte abnormalities, mainly hyponatraemia is a sign of unfavourable prognosis in COVID-19 and baseline electrolyte assessment, even after hospitalization, would be beneficial to assessing the risk for severe COVID-19. Hyponatraemia was significantly associated with severity of COVID-19 patients . To investigate the mechanism of electrolyte imbalance , more study of electrolytes in COVID-19 cases with multi center approach is needed .

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ORIGINAL ARTICLE

Outcome of Long Term Nebulization of Gentamicin on Lung Function and Respiratory Health Status among Non-Cystic Fibrosis Bronchiectasis

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Abstract:

Background: *Bronchiectasis is a disease state defined by irreducible dilations of the airways. If the changes occur in diseases other than cystic fibrosis they are termed non-CF bronchiectasis. Long-term therapy with nebulized gentamicin can eradicate the infection or reduce the bacterial load, decrease the risk of subsequent infections and improve the quality of life in patients with non-CF bronchiectasis with a minimal risk of side effect.*

Aims: *The aim of this study was to find out the outcome of long term nebulization of gentamicin on lung function and respiratory health status among non-CF bronchiectasis.*

Materials & Methods: *This prospective randomized controlled trial (RCT) was conducted at the Department of Respiratory Medicine in National Institute of Diseases of the Chest and Hospital from April 2020 to March 2021 in collaboration with the Department of Pathology, Radiology and Respiratory Laboratory. A total of 50 Non-CF Bronchiectasis patients were equally divided into 2 groups, gentamicin group and placebo group. All data were analyzed by using computer based SPSS-23(Statistical Packages for Social Sciences). P value of less than 0.05 was considered as significant*

Results: *Out of 50 patients with non-CFbronchiectasis, mean age was found 50.0±11.0 years in gentamicin group and 46.3±11.4 years in placebo group.Eighteen (72.0%) patients were male in group A and Sixteen(64.0%) in group B. Male to female ratio was 2.6:1 in group A and 1.8:1 in group B. Age, sex, occupational status, co-morbidities and BMI, were not statistically significant (p>0.05) between two groups. Following gentamicin therapy,SGRQ (36.0±10.2 vs 41.8±7.9) and 24 hour sputum volume (5.2±3.9 vs 7.8±2.5) was significantly decreased in gentamicin group than placebo group (p= 0.001). After gentamicin therapy, mean mMRC was not statistically significant between two groups (p=0.267). After therapy FEV_1 was significantly increased in gentamicin group than placebo group (42.5±9.4% vs 37.4±6.0, p=0.001).*

Conclusion*. We observed that gentamicin could significantly improve SGRQ and FACED score and reduce sputum volume compared to placebo. After therapy FEV_1 was significantly increased in gentamicin group than placebo group. Nebulized gentamicin may be used as an effective suppressive antibiotic therapy in these patient group.*

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Introduction:

Bronchiectasis is defined as an abnormal and permanent dilatation of one or more bronchi[1].It is a chronic respiratory disease presenting with chronic cough, sputum production, some have hemoptysis and shortness of breath. Increased production of mucous together with impaired mucociliary clearance leads to accumulation of secretion in dilated bronchi and causes recurrent respiratory infections. A vicious cycle is established involving persistent bacterial colonization, chronic inflammation of the bronchial mucosa, airway damage and remodeling. In most cases, infection is the primary force behind this ongoing cycle[2].

Bronchiectasis has a diverse range of pathological processes, including primary disorder of bronchial structure, impairment of mucociliary clearance, infectious cause (childhood pneumonia, PTB, Ig deficiency), inflammatory diseases such as rheumatoid arthritis, ulcerative colitis etc. In around 50% of adult patients, a specific etiology is not identified[3].Patients with bronchiectasis are prone to frequent exacerbations which have traditionally been viewed as being exclusively bacterial, evidenced by epidemiological data. Cohort studies showed that those patients treated with intravenous antibiotic therapy had a good clinical response[4,5].There were fewer exacerbations during the 12 months' treatment in the nebulized gentamicin group compared to the placebo group (0 [0–1] exacerbations and 1.5 [1–2] exacerbations, respectively; P<0.0001)[4].

Gentamicin is an aminoglycoside antibiotic. It acts primarily by disrupting protein synthesis leading to altered cell membrane permeability, progressive disruption of the cell envelope and eventual cell death.Nebulizedgentamicin, compared with intravenous administration can deliver high concentrations directly to the site of infection, eliminating the need for high systemic concentrations and reducing the risk of systemic toxicity.

The adverse events are dyspnea, chest pain, cough and bronchospasm. Although bronchospasm is well recognized side effect, it can be avoided by screening test and premedication with nebulized beta 2 agonist bronchodilator[4].

Materials and method:

This was prospective, randomized controlled trial (RCT) with no blinding.

This study was conducted in the Respiratory Medicine Department, National Institute of Diseases of the Chest and Hospital, Mohakhali, Dhaka between the period of April 2020 to March 2021.

Patients withnon-CF bronchiectasis were selected by history, clinical and radiological examination from the inpatient department of Respiratory Medicine of NIDCH. Eligible patients were randomly assigned in blocks of two parallel groups such as gentamicin group and placebo group to receive either gentamicin nebulization plus conventional treatment or only conventional treatment. Patients were not stratified on the basis of any criteria. The test group was given gentamicin nebulization 80 mg2 times daily for 4 weeks by nebulizer. The placebo group was taken only conventional treatment. Data was collected through appropriate questionnaire. Each patient was evaluated clinically and also by laboratory procedures before and after the nebulization. All the data were recorded systematically in a preformed data collection sheet and analyzed by using computer based SPSS-23(Statistical Packages for Social Sciences). P value of less than 0.05 was considered as significant

Observations and Results:

Table-I

Demographic characteristics of the study patients (n=50)

Demographic characteristics	Group A(n=25)		Group B (n=25)		P value
	N	%	N	%	
Age (years)					
≤20	0	0.0	1	4.0	
21-30	1	4.0	1	4.0	
31-40	4	16.0	7	28.0	
41-50	7	28.0	6	24.0	
51-60	9	36.0	6	24.0	
>60	4	16.0	4	16.0	
Mean ±SD	50.0 ±11.0		46.3±11.4		[a]0.246[ns]
Range (min-max)	26.0-66.0		19.0-62.0		
Sex					
Male	18	72.0	16	64.0	[b]0.544[ns]
Female	7	28.0	9	36.0	

(ns= not significant,[a]P value reached from unpaired t-test, [b]P value reached from chi square test, Group A= Gentamicin group, Group B= Placebo group)

Table-II

Occupational status of the study population(n=50)

Occupational status	Group A(n=25)		Group B (n=25)		P value
	n	%	n	%	
Farmer	0	0.0	1	4.0	
Businessman	8	32.0	7	28.0	
Cultivator	8	32.0	5	20.0	0.635^{ns}
House wife	7	28.0	7	28.0	
Service	2	8.0	4	16.0	
Student	0	0.0	1	4.0	

(ns= not significant, P value reached from chi square test,Group A= Gentamicin group, Group B= Placebo group)

Table-III

Smoking status of the study population (n=50)

Smoking history	Group A(n=25)		Group B (n=25)		P value
	N	%	n	%	
Current	10	40.0	7	28.0	
Ex-smoker	8	32.0	7	28.0	0.476^{ns}
Never	7	28.0	11	44.0	

(ns= not significant, P value reached from chi square test, Group A= Gentamicin group, Group B= Placebo group)

Table IV

Yield of sputum culture(n=50)

Microorganism culture	Group A(n=25)		Group B (n=25)		P value
	N	%	n	%	
No	15	60.0	13	52.0	0.569^{ns}
Yes	10	40.0	12	48.0	
Name of the bacteria					
Pseudomonas aeruginosa	5	20.0	6	24.0	
Klebsiella pneumoniae	3	12.0	4	16.0	
Streptococcus pneumoniae	1	4.0	2	8.0	
Staphylococcus aureus	1	4.0	0	0.0	

(ns= not significant, P value reached from chi square test, Group A= Gentamicin group, Group B= Placebo group)

Table-V

Parameters before and after therapy

Spirometric follow upFEV_1 (%)	Group A(n=25) Mean±SD	Group B(n=25) Mean±SD	P value
Before therapy	32.3±7.9	31.5±6.6	[a]0.715[ns]
Range (min-max)	18.0-49.0	20.0-46.0	
After therapy	42.5±9.4	37.4±6.0	[a]0.027[s]
Range (min-max)	22.0-56.0	28.0-50.0	
Mean change	10.2±4.1	5.9±1.7	0.001[s]
St. Georges Respiratory Questionnaire score (SGRQ) in different follow up			
Before therapy	56.3±12.2	50.8±10.4	[a]0.096[ns]
Range (min-max)	40.0-77.0	32.0-65.0	
After therapy	36.0±10.2	41.8±7.9	[a]0.029[s]
Range (min-max)	16.0-52.0	27.0-57.0	
Mean change	-20.3±6.6	-9.0±4.3	0.001[s]
Change in sputum volume (ml)			
Before therapy	17.6±5.0	16.8±4.5	[a]0.557[ns]
Range (min-max)	10.0-25.0	10.0-25.0	
After therapy	5.2±3.9	7.8±2.5	[a]0.008[s]
Range (min-max)	0.0-10.0	5.0-10.0	
Mean change	-12.4±3.6	-9.0±3.5	0.001[s]
mMRC score in different follow up			
Before therapy	2.72±0.45	2.64±0.49	[a]0.554[ns]
Range (min-max)	2.0-3.0	2.0-3.0	
After therapy	1.44±0.50	1.60±0.50	[a]0.267[ns]
Range (min-max)	1.0-2.0	1.0-2.0	
Mean change	-1.28±0.45	-1.04±0.20	0.020[s]
FACED severity score			
Before therapy			
Mild bronchiectasis (0-2)	4(16%)	7(28%)	
Moderate bronchiectasis (3-4)	19(76%)	15(60%)	0.475[ns]
Severe bronchiectasis (5-7)	2(8%)	3(12%)	
After therapy			
Mild bronchiectasis (0-2)	18(72%)	15(60%)	0.370[ns]
Moderate bronchiectasis (3-4)	7(28%)		10(40%)

Discussion:

The mean age was 50.0±11.0 years in gentamicin group (group A) and 46.3±11.4 years in placebo group (group B). The difference was not statistically significant (p>0.05) between two groups. Almost similar study was conducted where they showed median age was 58 years with range from 53 to 67 years in gentamicin group and 64 years with range from 55.7 to 69 years in placebo group[4].

Sputum culture yield growth of organisms in 40% and 48% in group A and group B respectively. *Pseudomonas aeruginosa was the most common organism found in both group. Literature shows that* Pseudomonas aeruginosa and Haemophilus influenza are the most common pathogen[6]. Pathogens in the airways of people with bronchiectasis and the geographical and community differences together with ethnic variation warrant further investigation.

In this study it was observed that in after therapy, mean FEV_1 was found 42.5±9.4 % in gentamicin group and 37.4±6.0% in placebo group. Mean change of FEV_1 was found 10.2±4.1% in gentamicin group and 5.9±1.7 % in placebo group. Which were statistically significant ($p<0.05$) between two groups. Mean FEV_1after therapy was statistically significant ($p<0.05$) within the gentamicin group compare with screening day. Previous studies reported mean change of FEV1 from baseline was predicted and they obtained suitable data from all study but one of these trials for pooling of the results[1,4,7,8]. The meta-analysis of eight trials with 558 patients showed a small, but statistically significant, difference in mean change in FEV_1 in favor of the control group. Murray et al. reported that there was no significant difference ofFEV_1 between the groups[4]. This may be due to using other conventional medications or patients condition either stable or exacerbation of non-CF bronchiectasis.

We found that after therapy, mean SGRQ was 36.0±10.2 in gentamicin group and 41.8±7.9 in placebo group. Mean change of SGRQ was -20.3±6.6 in gentamicin group and -9.0±4.3 in placebo group. Which was statistically significant ($p<0.05$) between two groups. Mean SGRQafter therapy was statistically significant ($p<0.05$) within the Gentamicin group compare toscreening day. Murray et al. observed that at each 3-monthly interval during treatment, significantly more patients in the gentamicin group achieved a clinically significant improvement in both LCQ score and SGRQ score compared with patients in the placebo group[4].

In this present study it was observed that followingtherapy, mean daily sputum volume was found 5.2±3.9 ml in gentamicin group and 7.8±2.5 ml in placebo group. Mean change of daily sputum volume was found -12.4±3.6 ml in gentamicin group and -9.0±3.5 ml in placebo group, which was statistically significant ($p<0.05$) between two groups. Mean daily sputum volumeafter therapywas reduced in group A compared to group B which was statistically significant ($p<0.05$).

Regarding mMRC in different follow up between two groups in this study we found mean change of mMRC was -1.28±0.45 in gentamicin group and -1.04±0.20 in placebo group which was statistically significant ($p<0.05$). Mean mMRCafter therapy was statistically significant ($p<0.05$) in the gentamicin group compare toscreening day. Mean mMRCafter therapy was also statistically significant ($p<0.05$) in the placebo group compare to screening day. Studies observed that the perception of dyspnea in subjects with bronchiectasis determined by using the mMRC score was significantly higher than that of healthy subjects[9] ($p<0.05$). Dyspnea is seen in 60% of patients with bronchiectasis[10,11]. Study used mMRC score to evaluate dyspnea[9], which was considered one of the major factors defining bronchiectasis[12] and affects the survival along with airway obstruction, pulmonary hyperinflation and frequency of disease[13].

In this study at screening day, nineteen (76.0%) patients were found to have moderate bronchiectasis (3-4 FACED score)in gentamicin group and fifteen (60.0%) in placebo group. After therapy, eighteen(72.0%) patients were found to have mild bronchiectasis (0-2 FACED score) in gentamicin group and fifteen (60.0%) in placebo group. This difference was not statistically significant ($p>0.05$). It was observed that in gentamicin group, moderate bronchiectasis was found 19 cases in screening day among them 14 cases were converted to mild and 5 remainsmoderate after therapy. In placebo group, moderate bronchiectasis was found 15 cases in screening day among them 8 were converted to mild and 7 remainsmoderate after therapy. All severe bronchiectasis 2(8%) in Gentamicin group and 3(12%) in placebo group converted to Moderate after therapy. So improvement of FACED score in group A was more compare to group B after therapy.

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CASE REPORT

An Unusual Case of Bilateral Bronchiectasis Following Foreign Body Aspiration

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Abstract:

Foreign body (FB) aspiration can be fatal if it obstructs the glottal opening, larynx, or trachea. Delayed presentations usually occur when the foreign matter obstructs one of the principal or distal bronchi and results in recurrent pneumonia, bronchiectasis, lung abscess or pyopneumothorax. FB aspiration is more common in younger children below the age of three years but not uncommon in older children and young adults.It is an uncommon cause of bronchiectasis. Here, we present a case of a 12 years boy who suffered an incidence of FB aspiration seven months back and presented with bilateral bronchiectasis and pneumonia. Development of bilateral bronchiectasis due to a single airway foreign body is very unusual. Nevertheless, this patient was revealed to have bilateral bronchiectasis along with consolidation.

Keywords: *Foreign body aspiration, Bilateral bronchiectasis, Consolidation*

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Introduction:

Foreign body (FB) aspiration can be defined as introduction of solid or liquid matter into the airway at the level or below glottis. It can be lodged at larynx, trachea, or bronchi. The complications can be immediate or late. Immediate complications usually occur when the foreign body is lodged in the glottal opening, larynx, or trachea, partially or completely obstructing the airway. Delayed complications usually occur when the foreign matter obstructs one of the main or distal bronchi and results in recurrent pneumonia, bronchiectasis, lung abscess and pyopneumothorax. Bronchiectasis refers to reversible or irreversible dilatation of bronchi due to damage to the bronchial walls. Common causes are infections, aspiration, defects in host defenses, genetic syndromes, anatomical defects and external airway compression[1]. In contrast, foreign body obstruction is an uncommon cause of bronchiectasis[2]. In this paper, we present a rare case of bilateral bronchiectasis and pneumonia following foreign body aspiration.

Case Presentation:

A 12 years old boy presented with cough and recurrent episodes of fever for last 7 months. The cough was persistent,productivewith large amount of mucoid or mucopurulent sputum production. On this occasion, he was suffering from fever for 7 days which was high grade and continued. He had been

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suffering from repeated episodes of fever for last seven months. He also complained of shortness of breath for the same duration which is progressive but mostly on exertion. There was no haemoptysis or chest pain.

He gave history of accidental aspiration of a plant seed into the airway followed by choking and coughing seven months back. But as the initial attack was subsided, the incidence was ignored and his parents failed to seek further medical attention at that time. There was no history of recurrent respiratory tract infection prior to the incidence of foreign body aspiration or history of previous pulmonary tuberculosis.

On examination, his vitals were normal except raised temperature. Other parameters of general examination were normal. Examination of his respiratory system revealed bilateral coarse crepitations altered after coughing over lower parts of chest. The patient was given symptomatic management and antibiotic.

His chest x-ray was unremarkable except inhomogeneous opacity in left lower zone. Complete blood count showed neutrophilic leukocytosis with raised ESR. His random blood sugar, serum creatinine and SGPT were normal. Sputum for C/S revealed no growth and sputum Xpert MTB reported as 'not detected'.

CT scan of chest showed an elliptical structure (Foreign body measuring about 12mm × 4mm) with

Fig.-1: *Chest X-ray*

smooth outline in the most proximal part of right principal bronchus. There were areas of consolidation in lower lobes of both lungs. Bronchiectasis was noted in lingular segment of upper lobe of left lung, middle lobe of right lung and lower lobes of both lungs.

Fiberoptic bronchoscopy (FOB) revealed a mobile foreign body in the proximal bronchial tree. The foreign body could not be removed through FOB. Rigid bronchoscopy was done after four days and the foreign body was extracted without any complication. The patient was discharged two days later and advised for follow up after one month.

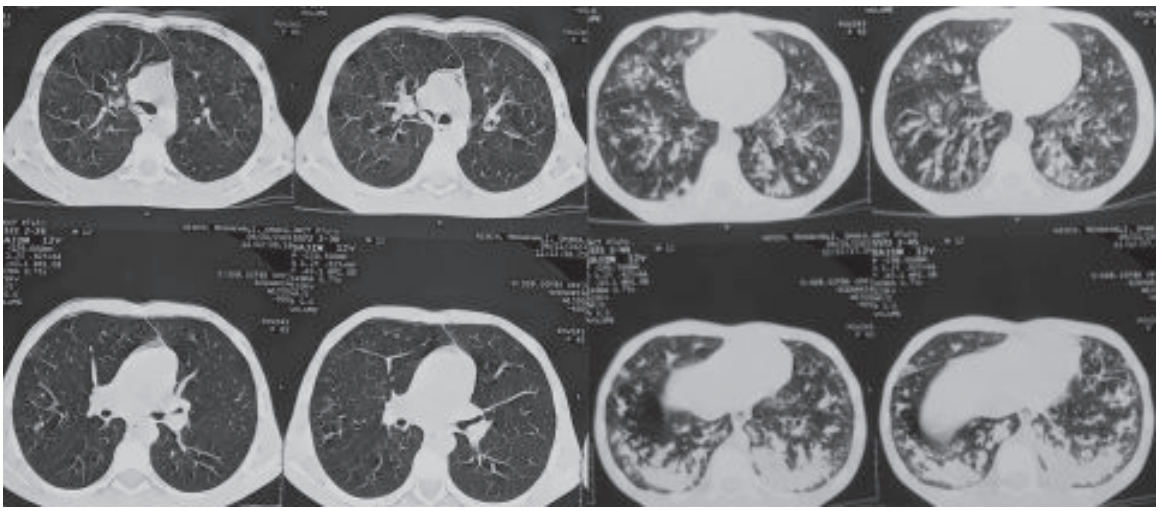

Fig.-2: *CT scan of chest showing a foreign body in the proximal part of right principal bronchus (A) and consolidation and bronchiectasis in lower lobes of both lungs (B)*

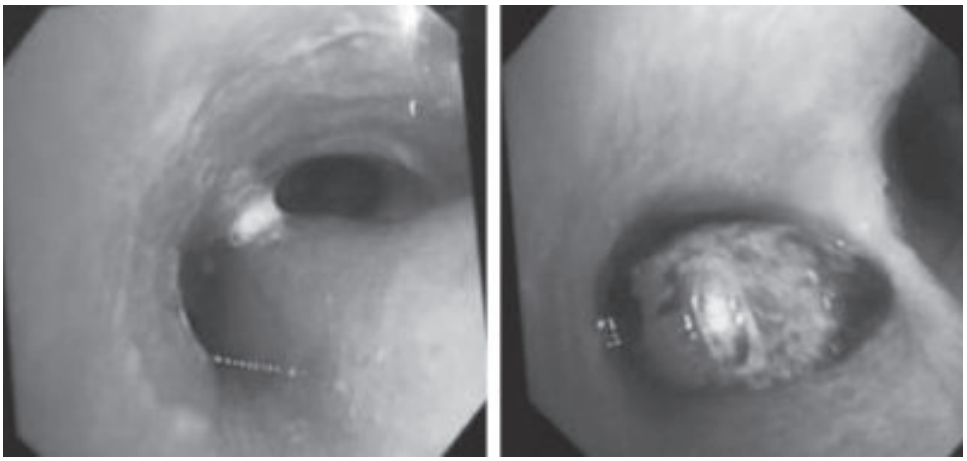

Fig.-3: *Fiberoptic bronchoscopy (FOB) showing carina (no foreign body) (A) and (after some time) foreign body at the beginning of left principal bronchus (B)*

Discussion:

We reported a case of a 12 years old boy with foreign body aspiration presenting with delayed complications. But airway FB has unique demography where 80% of cases are younger than three years old, with a peak incidence occurring in oneto two years old. In a retrospective case series, Asif et al.[3] reported 77.8% of foreign body aspiration in children under five years old, 16%between five and fifteen years and 6.2% by those above fifteen years old. Foreign body inhalation is more common in male children than female.

The variety of clinical presentations and outcomes of FB aspiration depends on many factors like the age of the child, site and extent of airway obstruction, period of foreign body impaction andavailability of health care facility[4,5].The emergency complicationof foreign body aspiration is acute respiratory distress leading to death. Non-removal of foreign body leads various delayed clinical features from simple coughing and wheezing to recurrent or chronic pulmonary infections, bronchiectasis and lung abscess.The diagnosis of a tracheobronchial foreign body requires a high index ofsuspicion and skill. Early management of FBA can prevent morbidity and mortality due todelayed or inappropriate diagnosis[5,6]. This was a delayed case of FB aspiration presenting with recurrent pneumonia and bilateral bronchiectasis.

The incidence of bronchiectasis followingforeign body aspiration is reported to be between 1 to 5.6%[7]. Development of bronchiectasis depends on the size, shape, localization and retention time of the FB[8]. The type of FB and the time of retention within the bronchial tree are the most important factors. It was reported that the risk of bronchiectasis increases with the retention time from aspiration to diagnosis[9]. In our case, the child presented seven months after the event of FB aspiration.

The diagnosis of FB aspiration requires obtaining a proper history. Whenever a choking episode is mentioned, bronchoscopy is indicated without relying on other diagnostic tools[10,11]. Flexible bronchoscopy is recommended for children newly diagnosed with bronchiectasis to exclude a foreign body or obstructive lesion[12]. Chest X-ray may not be of much help to identify foreign body. CT scan of chest should be performed in patients with chronic and recurrent bouts of cough and also haemoptysis, non-responsive to routine treatment and in case of recurrent or persistent consolidations in the same location. In the mentioned case, chest X-ray was unremarkable except inhomogeneous opacity in left lower zone. CT scan of chest showed an elliptical foreign body at the beginning of the right principal bronchus. CT revealed bilateral bronchiectasis and consolidation in both lungs.

Delayed cases of foreign body aspiration usually present with recurrent pneumonia of the same site or localized unilateral bronchiectasis. But this was a rare presentation of bilateral bronchiectasis and pneumonia following FB aspiration. During fiber optic bronchoscopy it was observed that the foreign body was mobile, obstructing both the principal

bronchi from time to time. The mobile nature of the FB was probably the reason for the development of bilateral lung disease.

Conclusion:

Foreign body aspiration into the tracheobronchial tree may result in a wide spectrum of presentations ranging from asymptomatic to death. Many patients do not report an aspiration event. These make the diagnosis of FB aspiration difficult and time consuming. Proper evaluation of suspected cases is very important. Early identification of airway FB and proper management can prevent the irreversible lung damage.

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