

STUDY OF PNEUMONIA IN DIABETIC PATIENTS

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ABSTRACT

Background: Diabetes - is a global epidemic and growing concern for health care providers due to wide range of complications. Pneumonia, a frequent coexistent of diabetes is an important cause of morbidity and mortality in diabetes.

Aims & Objective: (1) To study clinical presentation of cases of pneumonia in diabetes mellitus; (2) To study common etiological agents causing pneumonia in diabetes mellitus; and (3) To study outcome of patients of pneumonia in diabetes mellitus.

Materials and Methods: 50 patients having diabetes with pneumonia were studied in clinical, pathological and radiological aspects.

Results: Male patients and uncontrolled DM had higher prevalence on pneumonia associated with diabetes. Tuberculosis was present in majority of patients. Fever and cough were frequent presenting complains.

Conclusion: The mortality in these patients significantly affected by poor control of DM, presence of comorbid conditions and risk of septicemia and bacteraemia. A good glycaemic control reduces the chances of infections and hence a better outcome.

Key Words: Diabetes; Pneumonia; Tuberculosis

Introduction

Diabetes is the leading cause of morbidity and mortality in both developed and developing countries. IDF estimated that it is expected to reach more than 435 million in 2030.^[1] High incidence of diabetes in India is due to sedentary life style, lack of physical activity, obesity, stress and consumption of diet rich in fat, sugar and calories. Increasing economic growth will raise diabetes prevalence in India even more than what is estimated.^[1] Loss of productivity due to diabetes and specific diabetes related complication add to economic problem.^[1] Data suggest that Indians as an ethnic group have a high risk of type II DM most likely due to genetic susceptibility. So diabetes specific complications are also more common in Indian people than other races.^[2] Pneumonia, urinary tract infection & skin & soft tissue infection are all more common in diabetic population. In general, the organisms that cause pulmonary infection are similar to those found in the non-diabetic population; however, gram negative organisms, *S. aureus* and mycobacterium tuberculosis are more frequent organisms.^[3]

For patients with community acquired pneumonia, diabetes mellitus is one of the most common underlying disease.^[4] The magnitude & duration of hyperglycemia is strongly associated with the severity of micro vascular and neurologic complication.^[5] The presence of these complications adds to risk of infection. The predisposition for infection may also be based on conditions that interfere with normal clearance mechanisms and on disturbance of pulmonary immune cell function.^[2] Several aspects of immunity such as

polymorphonuclear Leukocyte function (i.e. leukocyte adherence, chemotaxis and phagocytosis) and bactericidal activity of serum are depressed in patients with diabetes.^[4] Alteration in T-lymphocyte subsets, including relative reduction in T-helper lymphocyte, could interfere with immune defence against infection. As a response to infection and cytokine release, insulin resistance in peripheral tissue occurs, resulting in the elevation at blood Sugar.^[5] Hyperglycemia impairs a wide range of functions in neutrophils & monocytes (macrophages)^[5] this is particularly important in limiting invasion by pyogenic and other bacteria. Adherence and phagocytosis depend on recognition of specific molecule on bacterial surface including bacterial glycoproteins as well as attached complement and Ig G produced as a result of the immune response to the infection. The movement of phagocytic cells to the sites of infection is generally impaired in diabetics but improves with glycaemic control.^[6]

The presence of healthy micro circulation is essential to certain infectious insults. Alteration in the function of capillary endothelium, the rigidity of red blood corpuscles and changes in the oxygen dissociation curve that occur as a result of chronic hyperglycemia are factors which affect the host ability to combat infection. It is therefore no surprise that patient with long standing diabetes with micro vascular complications are at a much greater risk of infections than non-diabetic or diabetics without complications. The reduced oxygen supply to tissue as a result of micro vascular changes predisposes them to infections by anaerobic organisms which grow best under such conditions.^[6] Diabetic gastro paresis

may increase risk of aspiration.^[3]

OBJECTIVES: (1) To study clinical presentation of cases of pneumonia in diabetes mellitus; (2) To study common etiological agents causing pneumonia in diabetes mellitus; and (3) To study outcome of patients of pneumonia in diabetes mellitus.

Materials and Methods

50 patients of Diabetes Mellitus having pneumonia were studied from July 2013 to January 2014. Detailed history and systemic examination was performed in all patients. Biochemical parameters like CBC, ESR, RFT, FBS, PPBS, HbA_{1c}, SGPT, Serum Electrolyte, urine routine, fundus examination, chest X-ray, and ultrasonography of kidneys are seen in each patient and sputum culture-sensitivity and sputum for AFB are done in patients according to clinical and radiological presentation. The diagnosis of diabetes was based on American Diabetes Association (ADA) criteria. Pneumonia was diagnosed by symptoms and x-ray chest. Follow up was done on basis of symptomatic improvement and by repeating chest radiograph.

Results

The number of males in this study group were more (64%) than females (36%). In present study maximum number of patient were in age group of 40-64 with an average age of 52.5 years. As shown in table 2, majority of patients in this study were of type 2 DM.

Table-1: Age & gender distribution

Characteristics	No. of patients	%	
Gender	Male	32	64
	Female	18	36
Age (Years)	15-39	07	14
	40-64	31	62
	≥ 65	12	24

In our study majority of patients had uncontrolled diabetes i.e. HbA_{1c} value more than 7. As shown in table 3, this study showed that about 48% patients had concomitant underlying disease. Multiple co morbidities were present in 20% of patients. In this study predominant symptoms noted were cough, fever, Anorexia and dyspnoea. Majority of patients in this study were of tuberculosis. Commonest cause of pneumonia in present study was tuberculous infection & next common is Strep. Spp. In the present study polymicrobial infection was present in 10% of patients. In present study multilobar involvement with cavity and fibrosis is present in 48%. Majority of patients in present study were of tuberculosis. Mortality in present study was 8%.

Table-2: Type of diabetes HbA_{1c} level

Characteristics	No. of patients	%	
Type of Diabetes	Type 1 DM	05	10
	Type 2 DM	45	90
HbA _{1c} Level	< 7	00	-
	≥ 7 to < 8	04	08
	≥ 8 to < 9	21	42
	≥ 9	25	50

Table-3: Concomitant diseases

Diseases	No. of patients	%
Hypertension	12	24
COPD	10	20
IHD	08	16
Others	03	06

Table-4: Predominant symptoms and radiological features

Symptoms and radiological features	N	%	
			Fever
Symptoms	Cough with or without expectoration	48	96
	Chest pain	17	34
	Anorexia	31	62
	Dyspnoea	34	68
	Weight Loss	15	30
	Other complain	08	16
Radiological Features	Multilobar involvement with cavity & fibrosis	24	48
	Pleural effusion	12	24

Table-5: Common causative organism

Diseases	N	%
AFB	16	32
Strept. Spp.	15	30
Klebsiella & Other gram negative	03	06
Atypical & fungal	09	18
Polymicrobial	05	10

Discussion

Males are more predisposed to diabetes with pneumonia. Miquel et al^[4] also reported that patients with diabetes were predominantly male (60%). Jette et al^[8] reported that 56% were male and 44% were females. Akbar DH also reported male predominance.^[7] This may be because of more exposure to environment, stress and presence of atherosclerosis apart from genetic factors. Jette et al^[8] observed 78% of patients having age >65 years with mean age of 62 years i.e. older patients. Probable reason for more number of younger patients in present study is that due to genetic susceptibility, Indian have high risk of type 2 DM & they develop diabetes at relatively younger age as compared to other races. They also develop diabetes related complication at younger age so life expectancy decreases and mortality occurs at relatively younger age.^[8] Jette et al also reported majority patients of type 2 DM. 93% diabetic population is of type 2 DM. Jette et al reported that 13% patient had HbA_{1c} more than 9 and 26% patients had HbA_{1c} less than 7. Probable reasons for uncontrolled diabetes in present study which had been conducted among lower middle class or poor population were Lack of education, Lack of awareness, so not following instruction about diet, Lifestyle

modification, exercise & regular medication. Miquel et al^[4] reported that 56% of patients had Concomitant underlying disease along with diabetes. Spomenka et al^[13] reported common causes of pneumonia in diabetes were Strep. Spp., Staphylococcus, Gram negative organism, fungal infection. Eirini et al^[3] reported common microorganism in diabetic were Strep. Spp., Klebsiella, E. coli and Fungi.

In a study from Congo, diabetes appeared to have an induction and aggravating effect on tuberculosis. Tuberculosis was found to be more frequent in diabetics, had more pronounced radiological signs, treatment failure and deaths were also more frequent.^[10] Miquel et al^[9] reported polymicrobial infection is present in 9% of patients. Miquel et al had not included tubercular pneumonia in their study.

Reason for high percentage of tubercular infection in present study is, there is high prevalence of tuberculosis in a population among which study is conducted. Also due to overcrowding spread of tubercular infection occurs and diabetics are already more vulnerable to infection. Hyperglycemia favours growth, viability and propagation of tubercle bacilli. Incidence of pulmonary tuberculosis among patients with diabetes was found to be three or four times as high as in general population.^[9] Prabhakar et al^[11] reported multilobar involvement in 50% patients. In diabetic patients with pneumonia, diabetes is associated with multiple lobe involvement and polymicrobial etiology.

Hyperglycemia impairs a wide range of functions in neutrophils and macrophages, this is important for limiting invasion by pyogenic and other bacteria so due to impaired immunity chances of multiple lobe increases. Tuberculosis in diabetic patients is associated with extensive caseation of lung tissue and cavitory lesion with less pleural involvement.^[3]

Mortality in diabetic patients was due to uncontrolled diabetes, associated comorbid condition and high risk of bacteraemia and septicemia. Miquel et al^[4] reported higher mortality 17%. Probable cause for lower mortality in present study was relatively younger age of patients, so immunity might be better. Another reason for lower mortality in present study is that majority of patients in present study had score 0 or 1 according to CURB-65 criteria^[12] which is for detecting prognosis of

patient with pneumonia.

Conclusion

The mortality in these patients significantly affected by poor control of DM, presence of comorbid conditions and risk of septicemia and bacteraemia. Good glycemic control of Diabetes, timely treatment with antibiotic according to sensitivity report and also good diet and supportive treatment improves outcome of pneumonia in diabetic patients.

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