Lower respiratory tract infection in diabetes mellitus

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Abstract

Introduction: Respiratory tract infections are perhaps the most common human illness. At present an epidemic of Diabetes mellitus (DM) is ongoing both in developed and developing countries. This study was conducted to analyze clinical impact of DM on lower respiratory tract infections (LRTI).

Materials and Method: Total of 50 cases of DM with lower respiratory tract infections were analysed in a period of 2 years during December 2013 to December 2015 to study the association between DM and lower respiratory tract infections. All 50 patients selected randomly from all ages and either sex admitted in TB and Chest ward of Pandit Dindayal Upadhyay Government Medical College and Hospital, Rajkot.

Results: The present study was carried out on 50 patients having DM with LRTI. The commonest age group affected was of 40-60 years (62%). Males were affected more than females with male: female ratio was 1.9:1. 72% patients were from rural area with 60% patients were from lower socioeconomic status and 36% patients were from middle socioeconomic status. Cough and fever were most common symptoms (96%). Besides that anorexia, weight loss, breathlessness, chest pain and haemoptysis were observed in 48%, 42%, 28%, 28% and 12% respectively. Duration of DM was less than 1 year and 1-5 years in 30% and 42% patients respectively. 10% patients had controlled DM while 70% had uncontrolled DM. 50% patients were on oral hypoglycaemic agents (OHA), 24% were on insulin and 6% were on both OHA and insulin, while 20% were first time detected as diabetic. Among all causative organisms of LRTI, *Mycobacterium tuberculosis* was the most common organism isolated in about 44% of patients. Other organisms like *Streptococcus pneumonia* (4%), *Klebsiella pneumonia* (4%), *Staphylococcus aureus* (2%), *Pseudomonas aeruginosa* (6%), *Escherichia coli* (2%), and *Influenza A* (H1N1) (6%) were also isolated. No organism was isolated in 32% patients. Radiologically, 48% patients had moderately advanced lesion, 40% had far advanced lesion and 12% had only minimal lesion. 40% patients had unilateral involvement while 60% had bilateral involvement. 80% patients had exudative lesion, 50% had cavitatory lesions while 16% had nodular lesions.

Conclusions: Study revealed that Lower respiratory tract infection is common clinical illness among diabetic patients. DM patients with age more than 50 years, duration more than 4 years and uncontrolled DM status have more chances of developing pulmonary infection and other DM related complication. *Mycobacterium tuberculosis* is the most common isolated pathogen among DM with LRTI patients. DM with pulmonary tuberculosis (TB) patients has higher sputum positive grading. Radiologically, moderate to far advanced lesions are more common with predominant exudative or mixed variety. There are higher chances of lower lobe involvement in DM patients. Influenza A (H1N1) pneumonia has higher mortality in diabetics than non-diabetics.

Keywords: Cough; DM; Lower respiratory tract infections; TB

Introduction

Respiratory tract infections are perhaps the most common human illness [1,4]. At present an epidemic of Diabetes mellitus (DM) is ongoing both in developed and developing countries [2]. Alternations in host defence mechanism in entire body as well as locally in lung, is the most important pathological factor in DM with lower respiratory tract infections (LRTI) patients. Impaired function of respiratory epithelium and impaired ciliary motility are also contributing factors [3-6]. DM with LRTI patients usually present with serious clinical features, longer duration of illness, more frequent complications and increased mortality [7,8]. Mortality due to LRTI in a diabetic patient is approximately four fold higher than the general population. Tuberculosis (TB) occurs with an increased frequency in diabetics with greater mortality. Increased reactivation of old TB lesions has also been reported in diabetics [9,10]. At the same time, TB appears to aggravate hyperglycaemia and patients requiring higher insulin doses than before. Incidence of diabetes as such appears to be higher among TB patients as compared to the general population [11-14]. The current study was undertaken to determine the correlation between LRTI in patients with DM.

Materials and Method

Total of 50 cases of DM with lower respiratory tract infections were analysed in a period of 2 years from December 2013 to December 2015 to study the association between DM and lower respiratory tract infections. All 50 patients selected randomly from all ages and either sex admitted in TB and chest ward, PDU Government Medical College, Rajkot.

Patients with DM, either known case or first time diagnosed, presented with LRTI determined by clinical and radiological findings, were included in this study. Patients having upper respiratory tract infection or having extra pulmonary manifestation without pulmonary infection were excluded from the study.

Data collection: All patients underwent detail medical history with detail physical examination. Routine laboratory investigations like haemoglobin, total WBC count, differential WBC count, random blood sugar, fasting blood sugar, post-prandial blood sugar, renal function test, liver function test, urine routine and microscopic examination, erythrocyte sedimentation rate, X-ray chest, two sputum smear examination for AFB with Ziehl-Neelsen stain and culture-sensitivity were carried out in all patients. Imaging study like ultrasonography and computed tomography scan were done whenever indicated. Diagnosis was made on the basis of clinical, radiological and laboratory findings. A written and informed consent was obtained from all the patients.

Results

Table 1: Demographic profile of 50 patients of DM with LRTI in present study

Age group	≤20 (04%) 21-40 (20%) 41-60 (62%) >60 (14%)
Gender (M : F)	33:17 (1.9:1)
Socio economic status	Lower - 60% Middle - 24% Upper - 16%
Residence	Urban - 58% Rural - 42%
Addiction	Smoking - 44% Alcohol - 26% Tobacco chewing - 64% Non addicted - 22%

Table 2: Clinical profile of 50 patients of DM with LRTI in present study

Symptomatology	Cough - 96% Fever -96% Breathlessness - 28% Anorexia - 48% Chest pain - 28% weight loss -12% haemoptysis - 42%
Duration of DM	First time detected - 20% <1 yr - 10% 1 to 5 yr - 42% >5 yr - 28%
Treatment history	First time detected - 20% OHA - 50% Insulin - 24% OHA + Insulin - 06%
Status of DM	First time detected - 20% Controlled - 10% Uncontrolled - 70%
Associated complication	Retinopathy - 14% Vasculopathy - 14% Nephropathy - 06% Neuropathy - 02%
Isolated organism	*Mycobacterium tuberculosis* - 44% *Streptococcus pneumonia* - 04% *Klebsiella pneumonia* - 04% *Staphylococcus aureus* - 02% *Pseudomonas aeruginosa* - 06% *Escherichia coli* - 02% *Influenza A* (H1N1) - 06% No pathogen isolated - 32%

Table 3: Radiological profile of 50 patients of DM with LRTI in present study

Location	Bilateral - 60%	
	Unilateral - 40%	Upper lobe - 08% Middle lobe - 04% Lower lobe - 16%
Type of lesion	Exudative - 80% Nodular - 16% Cavitatory lesion - 50%	
Extent of lesion	Minimal - 12% Moderately advanced - 48% Far advanced - 40%	

The present study was carried out on 50 patients having DM with LRTI. The commonest age group affected was of 40-60 years (62%). Males were affected more than females with male: female ratio was 1.9:1. 58% patients were from urban area while 48% were from rural area. 60% patients were from lower socioeconomic status, 24% from middle socioeconomic status and 16% from upper socioeconomic status. Cough and fever were most common symptoms (96%). Besides that anorexia, weight loss, breathlessness, chest pain and haemoptysis were observed in 48%, 42%, 28%, 28% and 12% respectively. Duration of DM was less than 1 year and 1-5 years in 30% and 42% patients respectively. 10% patients had controlled DM while 70% had uncontrolled DM. 50% patients were on OHA, 24% were on insulin and 6% were on both OHA and insulin, while 20% were first time detected as diabetic. Among all organisms causing LRTI, *Mycobacterium tuberculosis* was the most common organism isolated in about 44% of patients. Other organisms like *Streptococcus pneumonia* (4%), *Klebsiella pneumonia* (4%), *Staphylococcus aureus* (2%), *Pseudomonas aeruginosa* (6%), *Escherichia coli* (2%), and *Influenza A* (H1N1) (6%) were also isolated. No organism was isolated in 32% patients. 28% of the patients had family history of DM and 10% of the patients had family history of TB. Among 25 pulmonary TB patients 52% had grade 3+, 24% had grade 2+, 12% had grade 1+ of AFB in sputum examination, while 12% patients were diagnosed as sputum negative Pulmonary TB. Radiologically, 48% patients had moderately advanced lesion, 40% had far advanced lesion and 12% had only minimal lesion. 40% patients had unilateral involvement while 60% had bilateral involvement. Isolated lower lobe involvement, either unilateral or bilateral was seen in 54% patients. 80% patients had exudative lesion, 50% had cavitatory lesions while 16% had nodular lesion. 3 patients with Influenza A (H1N1) pneumonia died during this study.

Discussion

LRTI in DM was most common in age group of 40-60 years with mean age of 49.92 years. Males were affected more than females. Cough with or without expectoration and fever was the prominent clinical features. 28% of the patients had family history of DM and 10% of the patients had family history of TB, which suggest that DM has higher degree of genetic predisposition and DM patients have higher chances of developing TB because of immune compromised state. The mean duration of DM at the time of diagnosis of the pulmonary infection was 4.16 years. 70% of the patients did not have DM under control at the time of detection of LRTI, which suggests that a strict diabetic control is important to prevent such infections. *Mycobacterium tuberculosis* was the most isolated organism in 44% of diabetic patients. The reasons for inability to detect any organism in sputum in 32% of patients are dry cough due to early stage of consolidation, prior treatment with antibiotics and improper sputum collection. Radiographs suggested that isolated lower lobe involvement, either unilateral or bilateral was more common. Exudative lesion and cavitatory lesions were more common than nodular lesions. Most of patients had moderate to far advanced lesion with bilateral involvement.

Conclusions

LRTI is common clinical illness among diabetic patients. DM patients with age more than 50 years, duration more than 4 years and uncontrolled DM status have higher chances of developing LRTI and other DM related complication. *Mycobacterium tuberculosis* is the most common isolated pathogen among DM with LRTI patients. Patients of DM with pulmonary TB have higher sputum positive grading. Radiologically, moderate to far advanced lesions with bilateral involvement were more common with predominant exudative or mixed variety. Lower lobe involvement is more common among DM patients. Influenza A (H1N1) pneumonia has higher mortality in diabetics than non-diabetics. Study revealed that lack of education, poor life style, poor nutrition and absence of follow-up visits led to development of serious respiratory infections among diabetics. So there is a great need of health counselling regarding strict diabetic control and follow-up visits to improve their quality of life.

Conflicts of interest: None declared

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