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A STUDY OF THE SPECTRUM OF ILLNESS AMONG YOUNG MEN FROM A TRAINING CENTRE DURING AN OUTBREAKOF ACUTE RESPIRATORY TRACT INFECTION.

Medicine

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ABSTRACT

Background: Acute respiratory tract infections are a major cause of morbidity and absence from work across the globe as also in India.
Objective: To study the spectrum of respiratory tract infections (RTI) among hospitalized youngsters from a training institute during an outbreak of acute respiratory illness.
Methods: Trainees hospitalized for acute febrile illness underwent clinical examination and investigations including complete blood count, sputum Gram stain, culture and antibiotic sensitivity test and chest skiagram. All patients were provided appropriate treatment.
Results: A total 534 trainees suffered from RTI. Of these, 69 trainees (12.9%) were admitted during the period 13 April to 30 April 2018 with mean age of 19.6 (+/-2SD) years. Fever, cough and chest pain were the presenting symptoms. Majority (52.2%) were diagnosed with Community Acquired Pneumonia (CAP)followed by acute bronchitis (24.7%), viral fever with exanthem (11.6%) and viral fever (7.2%). Chest Radiograph showed lobar consolidation (44.5%) with maximum involving Right Lower Zone (RLZ). Infecting organisms could be isolated in seven cases- *Streptococcus spp* in five, *Staphylococcus spp* and *Klebsiella spp* in one case each.
Conclusions: CAP followed by acute bronchitis were chiefly responsible for hospitalization during an outbreak of acute respiratory infections among young trainees.

KEYWORDS

Respiratory Infections, Trainees, Outbreak, Consolidation

INTRODUCTION

Acute respiratory tract infections are a major cause of morbidity and mortality across the globe and in India.Globally, Lower Respiratory tract infections are responsible for 429.2 million cases as per WHO estimates, ranking fourth as the cause of mortality.[1] Almost 23% of the global pneumonia burden is contributed by India.[2] Every outpatient department owes a considerable number of patients to respiratory infections. This is despite the implementation of national programs like Integrated Management of Neonatal and Childhood Illness (IMNCI), Global Action Plan against Pneumonia and Diarrhea etc under National Health Mission (Ministry of Health & Family welfare, Govt of India). These programs have been specially designed to concentrate on the vulnerable groups like infants, pregnant women and malnourished children. It is interesting that respiratory infections, especially Community Acquired Pneumonia(CAP) are common in certain population groups than others.[3,4] Apart from those covered under the national programs, the elderly population, smokers etc are also particularly affected. Our study brings forward another such group, that of youngsters in a training institute. The milieu in a training centre is different from general life. The long training hours, the physical & mental stress, hygiene, diet and living conditions all contribute towards an atmosphere, which if not balanced, may lead to an outbreak of disease.[5] We present a study which describes the spectrum of one such outbreak of acute respiratory tract infections among young trainees at a training center. It strives to understand the merits and demerits in approaching and managing such a situation.

AIM

To study the spectrum, the symptomatology, radiological and pathological features of respiratory tract infections among hospitalized youngsters from a training institute.

MATERIALS AND METHODS

This is a retrospective observational study spanning over the study duration from 13 April 2018 (date of admission of first trainee) to 30 April 2018 (date of last admission).

Participants: All the trainees hospitalized for acute febrile illness were included in the study. Following trainees were not included in the study:
1. Those treated for chief complaints other than fever.
2. Cases of febrile illness hospitalized prior to study duration.
3. Cases with other respiratory morbidities like tuberculosis or lung malignancies.

The first case was diagnosed on 13 April 2018 as Bilateral pneumonia and required intensive care for sepsis. Thereafter, the trainees were screened on a daily basis by the training instructors.Thosewho had symptoms and were unable to perform physical training were examined by the Medical Officer at the dispensary. After thorough clinical examination, trainees with acute febrile illness, persisting despite medication or showing progression of symptoms, were referred to secondary care centre for hospitalization and further management.

Every such admitted traineeunderwent a detailed clinical examination and complete investigation profile includingHemogram(Sysmex KX 21), ESR (Wintergreen method), Malaria Antigen testing(J Mitra & Co Pvt Ltd), Dengue IgM & IgG(J Mitra & Co Pvt Ltd) , Widal test (Arkraoi Healthcare Pvt Ltd), Weil Felix test(Tulip Diagnostics), Chest X ray (posteroanterior view), throat swab &cultureand sputum for Gram stain, acid fast bacilli (AFB) stain and culture and sensitivity, before starting empirical antibiotic therapy. Due to limited resources, PCR or serology for diagnosis of various viral infections, apart from dengue, could not be performed.

Interpretation of results

Based on the clinical, pathological and radiological correlation, an algorithm was designed to arrive at the diagnosis and begin treatment at the earliest. A trainee was diagnosed as a case of

1. Community Acquired Pneumonia (CAP) when the radiologist detected newly developed consolidation involving at least one pulmonary zone on the chest radiograph.
2. Acute Bronchitis if there were no findings on chest radiograph despite symptoms of ion of dyspnea and chest pain and clinical findings of crackles and wheeze.
3. Viral fever with exanthem if he had

- fever with maculopapular rash
- all infections (malaria, dengue, enteric fever, typhus) were ruled out
- throat swab/ sputum culture showed no growth

- Chest radiograph had no new findings

4. Viral Fever was similarly diagnosed with the only difference being absence of rash.

In cases of CAP, a review chest radiograph was scheduled on the 10th day of antibiotic treatment, to assess the progression or recession of consolidation or any new development. After discharge, the trainees were reviewed after a fortnight.

RESULTS

A total of 534 trainees presented in the outpatient department with acute febrile illness during the study duration. Of these, 69 (12.9%) required hospitalization. The youngest trainee was 18 years of age while the eldest was 21 years of age with mean age being 19.6 (+/- 1.62) years.Apart from fever, the common presentation was with coryza, rhinorrhea, sorethroat, headache, body ache, cough, chest pain, dyspnoea, rashand loose motions [Table 1].The most of the symptoms were non-specific. Majority of trainees treated on outpatient basis [347(74.6%)] presented with upper respiratory catarrh while the rest (118[25.4%]) had features of acute pharyngo-laryngitis.

Among the 69 trainees hospitalized, 36 (52.2%) were diagnosed with Community Acquired Pneumonia (CAP) with right lower zone (RLZ) involvement in 17 (24.6%), left lower zone (LLZ) involvement in 11(15.9%), right middle zone (RMZ) involvement in 3 (4.3%) and more than one zone involvement in 5 (7.2%) cases. Among the rest [Table 2], acute bronchitis was diagnosed in 17 (24.7%) cases, viral fever with exanthem in 8 (11.6%) cases, viral fever in 5 (7.2%) cases. There were 2 (2.9%) cases of enteric fever and 1 (1.4%) case of Parotitis (Mumps). Two cases were diagnosed as enteric fever significant titer on Widal test. Chest Radiograph findings showed consolidation in the affected zones. The most common involvement was that of lower zone of lung with maximum 17 (24.6%) involving RLZ.

Causative organisms could be isolated in seven cases. Throat swab culture findings were significant in two cases and sputum culturefindings were significant in five cases. Throat swab detected one case of *Staph spp*, a finding concurrent with sputum culture. In other case, throat swab culture grew *Strep spp*. Sputum culture grew Streptococcus species in four cases while Klebsiella species in one case. Complications developed in four cases; two cases developed sepsis, one developed loculated pleural effusion and other developed empyema thoracis. All cases with complications were managed successfully and eventually returned to training.

DISCUSSION

There is an ongoing epidemiological transition wherein the disease burden of acute infectious diseases, especially of childhood, is being replaced by chronic non-communicable diseases of the elderly. Yet, decline in mortality due to infectious diseases has hardly changed the total number affected by the infectious diseases because of the exponential growth in population in developing countries like ours. Acute respiratory infections are still responsible for considerable morbidity in India, though it affects susceptible age groups like maternal and child health. Lower Respiratory Tract Infections(LRTI) especially CAP account for 20% of mortality due to infectious diseases in India. However, there is dearth of data regarding the rate of hospitalization among Indians. In US military, 25 to 30 % recruits require hospitalization for respiratory tract infections.[5] In our study, hospitalization was required in 12.9% cases. CAP generally affects a person very early or very late in life. The annual incidence of CAP is 2 to 12 cases per 1,000 with majority observed in infants and the elderly.[6]

The mean age of the trainees in our study was 19.6 (+/-1.62) years. Most of the studies in India have analyzed the susceptible population groups, the under five years age and more than 50 years age.[7,8,9] It appears that young trainees living together in dormitories or hostels, away from home for physical training purposes in an institution, are another vulnerable group. This is comparable to what has been observed among military recruits.[10] As per the synopsis on Respiratory Diseases among U.S. Military Personnel, the risk of respiratory infection exceeds among military personnel than their civilian peers.[5] The average age of affected US army recruits was 19 years when compared to their civilian counterparts with broad age range of 15 - 44 years. This has been attributed to crowded living conditions, stressful working environment, and exposure to respiratory pathogens in disease-endemic areas.

Majority of hospitalized trainees presented with cough, dyspnoea and chest pain, apart from fever. High grade fever with rigors and chest pain is characteristic of pneumococcal pneumonia. Other symptoms like rhinorrhea, conjunctivitis, sore-throat, headache, body-ache and rash have been frequently seen in CAP, tracheobronchitis and bronchiolitis depending on the etiology (bacterial or viral). Atypical symptomatology like altered sensorium, nausea, vomiting, loose motions, pain in abdomen etc, usually associated with atypical pneumonia was not encountered in this study.[11]

LRTI include pneumonia, tracheobronchitis and bronchiolitis caused by different organisms. Radiologically confirmed CAP predominated the diagnostic spectrum in our study, followed by Acute bronchitis. Radiological finding of lobar consolidation was found in atleast one lobe in 86.1% (31/36) radiologically confirmed CAP cases). Rest 5 (13.9%) cases showed multi-lobar involvement. Right sided pneumonia (55.6%) was more common than left sided pneumonia (30.6%). This has been observed in another study where 61.5 % cases showed right lung involvement.[8] This may be a consequence of the anatomical structure of bronchial system, right main bronchus being wider and more vertically oriented than left main bronchus. Apart from consolidation, radiography findings like mediastinal lymphadenopathy, cavitation, peri-bronchial cuffing reported in different studies, were not seen in our study.[8,12]

Culture studies of sputum and throat swab yielded results in 7 (10.1%) cases. The low detection rate was probably due to exposure to antibiotics prior to referral of patient to our institution(in an attempt to control the increasing burden of acute respiratory infections). *Strep spp* was isolated in majority 5(71.4%) cases and one case each of *Staph spp* and *Klebsiella spp* were detected. According to various studies, viral causes are common than bacterial agents, especially adenovirus, influenza and respiratory syncytial viruses have been reported to cause outbreaks in military trainees.[5,12] Among the bacterial agents, *Streptococcus pneumonia*, *Strep pyogenes* and *Staph aureus* are the main causative organisms. Atypical pneumonia is known to be a result of infection by *Mycoplasma pneumoniae, Haemophilus influenzae, Chlamydia pneumoniae and Legionella pneumophila*.[11]

Complications developed in 4 (5.7%) cases, 50% were caused by sepsis while the other 50% included loculated pleural effusion and empyema thoracis. This is in concordance with other studies where sepsis was found in 16% followed by pleural effusion 12%.[8] Sepsis is a common complication in cases of CAP.

Our study has the limitation of the diagnostic resources for detection of viral and atypical agents were severely limited, a problem also discussed in the context of India in Joint ICS-NCCP guidelines for treatment of community acquired and nosocomial pneumonia.[13]

CONCLUSION

CAP followed by acute bronchitis were responsible for majority of cases of hospitalization during an outbreak of acute respiratory infectionsamong young trainees. The symptoms were typical including cough, chest pain and dyspnoea, apart from fever. Lobar consolidation was the consistent finding on chest radiographs with predominant involvement of right lung. Streptococcus species was the causative organism detected in maximum cases.However,the culture yield was very lowprobably due to prior exposure to antibiotics.

Young trainees need to be identified as a group with high risk for acute respiratory infections. The diagnostic resources to establish viral causative agents should be acquired or outsourced. With many obstacles like changing virulence of causative agents, lack of laboratory resources and antibiotic resistance, it is imperative to recognize the need of immunization, (like pneumococcal vaccine, annual influenza vaccine and vaccine against common strains of adenovirus) to decrease the morbidity and mortality due to these infections.

TABLE-1 Frequency Of Symptoms Among Trainees
(some symptoms were common among trainees and so overlapped)

SYMPTOM	NUMBER OF CASES
Coryza	234
Rhinorrhoea	229
Sorethroat	181
Headache	168

Conjunctivitis	107
Bodyache	87
Cough	49
Chest pain	32
Dyspnoea	29
Rash	8
Loose motions	2
Pain in swallowing	1

TABLE 2: Distribution Of Cases According To Diagnoses

MODE OF CARE	DIAGNOSIS	NUMBER OF CASES (%)	TOTAL (%)
OUTPATIENT	UPPER PESPIRATORY CATARRH	347(74.6)	465(87.1)
	ACUTE PHARYNGITIS	118(25.4)	
INPATIENT	PNEUMONIA	36(52.2)	69(12.9)
	ACUTE BRONCHITIS	17(24.7)	
	VIRAL FEVER WITH EXANTHEM	8(11.6)	
	VIRAL FEVER	5(7.2)	
	ENTERIC FEVER	2(2.9)	
	PAROTITIS	1(1.4)	
TOTAL			**534**

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