Original Article

Radiological imaging techniques as a tool to compare the incidence of asthma among traffic policemen to the security individuals

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Abstract

Objective: To determine the incidence rate of asthma among Traffic Police Individuals and to compare with the incidence rate in Security Individuals from the abnormalities detected in the Radiological examination. **Methods:** Radiological examination including Chest X-ray and HRCT was done in 50 male Traffic Police Individuals and 50 male Security Individuals. **Results:** Among 50 male Traffic Police Individuals, Chest X-ray diagnosed 12 individuals as asthmatic from the abnormalities compared to HRCT that could diagnose 36 individuals as asthmatic. Among the Security individuals, Chest X-ray diagnosed 3 individuals as asthmatic compared to the HRCT that diagnosed 11 individuals as asthmatic. **Conclusion:** The study shows that the incidence of Asthma is more in Traffic police individuals than the Security individuals. The study also shows that HRCT is of more diagnostic accuracy than Chest X-ray in asthma.

Keyword: asthma, traffic police.

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INTRODUCTION

Occupational Health is the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations by preventing departures from health, controlling risks and the adaptation of work to people, and people to their jobs. A report says that by 2020, lung diseases will become the second biggest killer globally.[6] Among the motor vehicle-generated air pollutants, diesel exhaust particles account for a highly significant percentage of the particles emitted in many towns and cities. Acute effects of diesel exhaust exposure include irritation of eyes and nose, lung function changes, headache, fatigue, and nausea. Chronic exposure is associated with cough, sputum production, and lung function decrements. One of the important lung disease found in Traffic policemen is Asthma. Asthma is a relatively common condition that is characterized by at least partially reversible inflammation of the airways and reversible airway obstruction due to airway hyper-reactivity. It can be acute, sub acute or chronic. Asthma is histologically characterised by the presence of chronic inflammation of the airways. The bronchi are thickened by a combination of oedema, bronchial wall smooth muscle hyperplasia and an increase in the size of the mucous glands associated with the airways. It mainly involves the medium sized and small bronchi. Identification and assessment of the risks from health hazards in the workplace This involves surveillance of the factors in the working environment and working practices which may affect workers' health. It also requires a systematic approach in identifying the individuals who are prone for acute attacks of Bronchial Asthma. The present study aims to diagnose and compare the incidence of Asthma in Traffic policemen and security men using Chest X-ray and High Resolution computed tomography as radiological tools of diagnosis.

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MATERIALS AND METHODS

The study was conducted in 50 male Traffic Policemen and 50 male Security men in the age of 45 to 55 years. The traffic policemen were working for 8 hours daily for the past 15 years in heavy traffic areas of the city. The security men were working in the buildings of the residential colony for 8 hours daily for the past 15 years. The inclusion criteria included age range of 45 to 55 years, male subjects on average Indian diet and not taking any medication. The exclusion criteria included the tobacco smokers and chewers, Alcoholics, Any respiratory or other systemic diseases and any other environmental exposure. Chest X-ray in Posterio-Anterior and left lateral view in erect posture and HRCT was done on all the individuals and the findings were reported by the physician.

RESULTS

Among 50 male Traffic Police Individuals, Chest X-ray diagnosed 12 individuals as asthmatic from the abnormalities compared to HRCT that could diagnose 36 individuals as asthmatic. Among the Security individuals, Chest X-ray diagnosed 3 individuals as asthmatic compared to the HRCT that diagnosed 11 individuals as asthmatic.

The abnormal finding identified by the Chest X-ray in the Asthmatics were

1. Pulmonary Hyperinflation,
2. Bronchial wall thickness and

The abnormal findings that are non-specific individually, identified by the HRCT in the Asthmatics were:

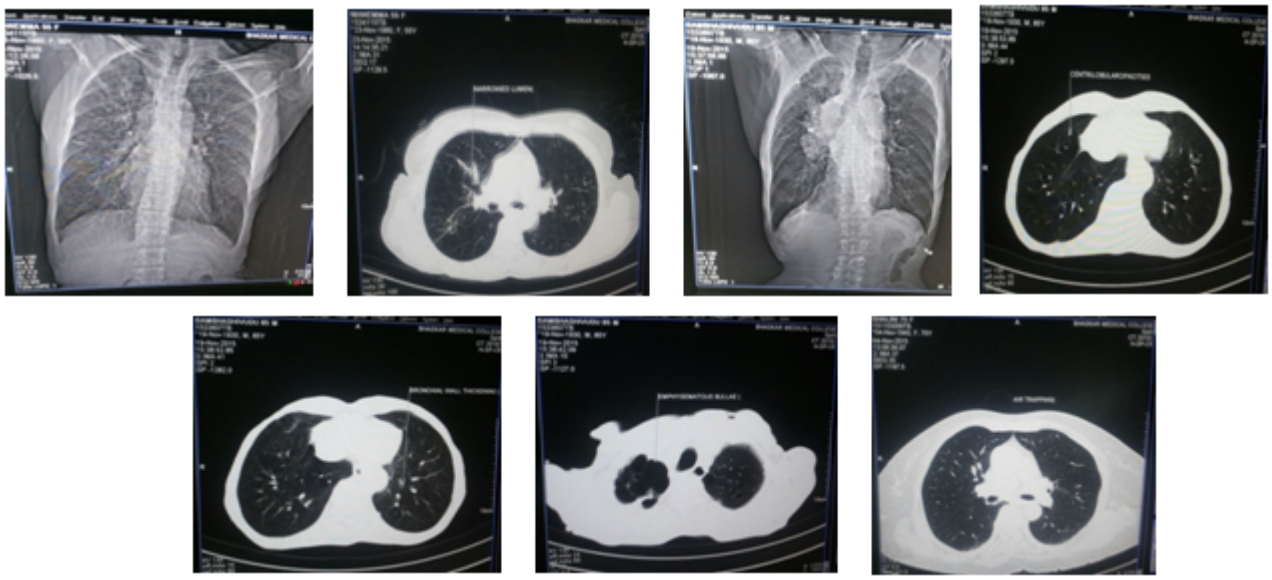
1. Bronchial wall thickening,
2. Expiratory air trapping,
3. Inspiratory decreased lung attenuation,
4. small centrilobular opacifities,
5. bronchial luminal narrowing: reduced bronchoarterial-diameter ratio,
6. subsegmental bronchiectasis.

The findings of the Chest X-ray were inconsistent among the individuals with bronchial wall thickness alone predominating. Similarly identical findings may be observed with other lung diseases. The HRCT gives a consistent two or more finding in all the individuals that are diagnostic features of Asthma. The table gives the abnormalities that were identified from Chest X-ray and HRCT in number of Traffic policemen.

Radiological tool		
Findings	Chest X-Ray	HRCT
Bronchial wall thickening,	12	36
Expiratory air trapping	05	36
Inspiratory decreased lung attenuation	-	18
small centrilobular opacifities,	-	12
bronchial luminal narrowing:	-	18
subsegmental bronchiectasis	**-**	**10**

The table gives the abnormalities that were identified from Chest X-ray and HRCT in number of security men.

Radiological tool		
Findings	3	11
Expiratory air trapping	1	9
Inspiratory decreased lung attenuation	-	4
small centrilobular opacifities,	-	6
bronchial luminal narrowing:	-	9
subsegmental bronchiectasis:	**-**	**3**



DISCUSSION

The study finds a high utilization of radiological tool for diagnosis of the Asthma. Chevallier Jackson states, "All that wheezes is not asthma." This recognition suggests that imaging has an important role in differentiating asthma from its mimics and that further diagnostic evaluation and treatment of nonasthma conditions may be necessary. Chest radiography is the initial imaging evaluation in most individuals with symptoms of asthma. The value of chest radiography is in revealing complications or alternative causes of wheezing and the minor importance of wheezing in the diagnosis of asthma and its exacerbations. It usually is more useful in the initial diagnosis of bronchial asthma than in the detection of exacerbations, although it is valuable in excluding complications such as pneumonia and asthma mimics, even during exacerbations.[5] Although bronchial thickening, hyperinflation, and focal atelectasis suggest asthma when they are present, chest radiographs obtained during asthma exacerbations can demonstrate normal findings, which reduce its sensitivity as a diagnostic tool. Similarly, identical findings may be observed with chronic bronchitis and viral bronchopneumonia, among other conditions, and these similarities limit the specificity of chest radiography.[5] In the present study, the chest X-ray in PA view has found bronchial wall thickening in 12 traffic policemen and Expiratory air trapping in 5 traffic policemen. In security men, chest X-ray in PA view could identify bronchial wall thickening in 3 and Expiratory air trapping in 1 individual. Other abnormalities were not identified in the chest x-ray. E Eddy and AM Kelly study found a high utilisation of chest X-rays for ED asthma patients.[3] Charles S. White, M.D. *et al*., suggest that admission CXR is appropriate for adult patients admitted with acute asthma refractory to emergency ward therapy.[2] High-resolution computed tomography (HRCT) is a second-line examination. It is useful in patients with chronic or recurring symptoms and in those with possible complications such as allergic bronchopulmonary aspergillosis and bronchiectasis and not to directly diagnose asthma. HRCT is more costly than chest radiography and exposes the patient to more radiation. Nevertheless, CT scans can demonstrate a number of findings that support the diagnosis of asthma. HRCT was determined to enhance the accuracy of radiologic diagnoses relative to routine radiography.[4] In this study, in traffic policemen, HRCT could identify bronchial wall thickening in 36, Expiratory air trapping in 28 individual, Inspiratory decreased lung attenuation IN 17, small centrilobar opacifities in 12, bronchial luminal narrowing in 18 and subsegmental bronchiactasis in 10 individuals. In security men, HRCT could identify bronchial wall thickening in 11, Expiratory air trapping in 9 individual, Inspiratory decreased lung attenuation IN 4, small centrilobar opacifities in 6, bronchial luminal narrowing in 9 and subsegmental bronchiactasis in 3 individuals. ZA Aziz *et al*[7] study also shows that HRCT is used as a diagnostic tool for the diffuse paranchymal lung diseases. The study done by the Koichi Nishimura *et al*[4] also agrees with this study that HRCT is superior to X-ray in definitive diagnosis of lung diseases. HRCT remains the most sensitive study for morphologic changes associated with asthma. HRCT has the potential to aid with the functional assessment of the lungs, such as tests of airtrapping and the bronchodilator response. The specificity of HRCT for bronchial asthma is limited by the similarity of its changes to those of other diseases, such as bronchiectasis, chronic bronchitis, emphysema, and bronchopulmonary aspergillosis. The main disadvantages in the application of HRCT scanning in humans are radiation dose, the complexity of HRCT data analysis for the more complex edge finding algorithms, and technical problems over selection of phantoms for verification.[1]

CONCLUSION

In conclusion, the study finds higher incidence of asthma in traffic policemen than in security individuals. The study also finds that the chest x-ray is the first choice of imaging when the patient arrives at the hospital. X-ray imaging is the choice in screening purpose whereas when a definitive diagnosis is required, x-ray has its limitations. HRCT is superior in identifying the number of abnormalities than the X-ray. But there is higher levels of exposure to the radiations in HRCT when compared to very minimal exposure in x-ray. Therefore the study recommends the use of HRCT only when there is a need of definitive diagnosis in acute cases where the x-ray is of limited use.

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