

PROSPECTIVE STUDY ON EFFECT OF IMMUNOLOGICAL CONSEQUENCES AND THE MODULATION OF RESPIRATORY SYSTEM BY OCCUPATIONAL DISEASES

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Article Received on
20 Feb. 2019,

Revised on 10 March 2019,
Accepted on 31 March 2019

DOI: 10.20959/wjpr20195-14745

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ABSTRACT

The incidences of respiratory hypersensitivity and occupational respiratory diseases (ORDS) have been expeditiously increased over last decade. The term occupational respiratory diseases is a broad spectrum including various diseases such as occupational Rhinitis, Pneumoconiosis, Mesothelioma, Emphysema, Eosinophilia, Bronchitis, Asthma, Chronic obstructive pulmonary disease, lung cancer are the major consequences studied. This rise in the statistics of occupational respiratory diseases was tremendously increased equally in both adults and geriatric population. The present study on the immunological modulation in respiratory system caused mainly due to exposure to the organic dust toxic substances who have been admitted in tertiary care hospital considering sample size of 300 subjects. Age, sex, histopathological reports of the patients was considered at the time

of visits. Specific settings and agents are quoted which have been indicated or confirmed as linked to occupational respiratory diseases in occupational works like coal miners, hard- rock miners, woodworkers, concrete manufacturing workers, painters, traffic police officers, industrial based workers, petrol bunk workers, cloth dyeing, flock workers, rice mill workers, textile industrial workers. The immunological consequences that are triggered by work place allergens, inflammatory mediators, gene immune responses and activation of cytokine pathways are triggered leading to pathological changes in these patients. During the analysis of the study it has been revealed that decrease in exposure to the organic dust toxic substance have subsidized the symptoms in the patient. The results revealed that different age group people belonging to distinct occupation having deteriorating health effects on respiratory

system which is mostly due to organic dust exposure and preventive measures has to be considered during the professional working hours.

KEYWORDS: Occupational Respiratory Diseases, Organic Dust Toxic Substances, Immunological Modulation, Cytokine Pathway.

INTRODUCTION^[1-5]

According to the SWORD (surveillance of work related and occupational respiratory disease) system initiated in the UK in 1989, acute inhalational injuries, SWORD scheme registered an annual incidence rate of 5 per million in men and 1 per million in women. Asthma is most frequently occurring work related respiratory disease. The population attributes risk of work related exposure has been estimated to approximately 17% of all adult asthma cases, new onset occupational asthma of 250-300 cases per 1million people per year. The population attributable fraction of occupational factors to COPD morbidity estimated to range from 5-20% and may reach 40% among non smokers. Interstitial lung diseases(ILDs) includes pneumoconiosis, asbestosis, extrinsic allergic alveolitis (EAA) accounts 7200 cases lung cancer contribute to estimate 15% in men and 5% in women. Overall 24% risk is observed, pleural disease (malignant mesothelioma) tumors which are typically caused by asbestos exposure.

The cells express different receptors toll like receptors (TLRs), C-type lectin (CTLs) and protease activated receptors (PARs) that are triggered by work place allergens, when triggered epithelial cells produce proinflammatory cytokines IL-6, IL-8, inflammatory mediators IL-25, IL-33 Th2 (The helper cell type2) gene immune response which stimulates neutrophils,^[6,7] granulocytes, lymphocytes, resulting in inflammation activation of Th2 cytokine pathway triggers IL-4,IL-13, activation in production of IgE. IL-17A, IL17, have role in activation migration of neutrophils, to inflamed sites. ILC2 cells resemble the receptors via innate receptors. Th2 activated via T-cell receptors recognition cognate antigen presented by dendritic cells which contribute in airway hypersensitivity. The immunological consequences, cellular and molecular mechanisms as well as associated gene expressions due to ODTS(organic dust toxic substances) like silicosis and asbestosis are widely investigated and these compound mechanisms involved in initiating inflammation and progression to fibrosis are comprehensively studied, though yet to be totally understood in case of pneumoconiosis. Recent advances in this field and clinicopathological features presented are the evidences which apparently prognosticate both interstitial lung diseases and which caused

by chronic exposure to inorganic dust.^[8] The insidious growth and the clinical presentation of the occupational related mesothelioma have been studied in the effected persons which illustrate than at an advanced stage of disease, conventional therapies with a combination of aggressive surgical interventions and multimodality strategies are the interventions pilled up molecular genetic analysis have been revealed the development and progression of mesothelioma which is mainly cyclin dependent kinase inhibitor 2A/alternative reading frame (CDKN2A/ARF), neurofibromatosis type 2(NF2) and BRCA1 associated protein- 1(BAP1) genes are the most frequently mutated tumor suppressor genes detected in mesothelioma cells.^[9,10]

However, the main objective of this prospective study is to evaluate the occurrence of occupational disease which leads immunological modulation and has been studied in tertiary care hospital considering 300 sample sizes.

MATERIALS AND METHODS^[10-12]

The study procedure conducted is prospective study conducted in a tertiary care hospital considering the 300 sample size. Comprehensive information was collected from the patient questionnaire section, histological reports and all the information relevant to study was collected from the survey based data form. Questions were from the areas of the occupational setup, danger signs, and health condition during work, immunization factors are mentioned below.

Table 1: Showing questionnaire.

Questions	Yes	No
1. History of any previous respiratory diseases	-	+
2. Any hereditary respiratory problems?	-	+
3. Long term exposure to occupation	+	-
4. Occupation induced respiratory symptoms	+	-
5. Worsening of symptoms due to organic dust exposure	+	-
6. Symptoms due to other diseases	-	+
7. Wheezing in last 12 months	+	-
8. Nocturnal SOB	+	-
9. Spontaneous SOB	+	-
10. Chest tightness in last 12months	+	-
11. Frequent hospitalization due to respiratory disease symptoms	+	-
12. Cough/phlegm/SOB in last 12months	+	-
13. Any hypersensitivity reactions during working hours?	+	-
14. Ever been told by doctors that have any respiratory problems caused by or made worse by work	+	-
15. Respiratory symptoms during non-working hours	+	-

Source of Data

Patient's data relevant to study will be obtained from the following sources:

- Interaction with patient.
- Histopathological report of patient.
- Survey based data form.

METHODS AND COLLECTION OF DATA**Study criteria****Inclusion criteria**

Subjects who had been exposed occupationally for a minimum of 3 years were included. individuals that did not have any other pathological conditions like hypertension, diabetes, no history of respiratory disorders and who were not under any medications other than analgesics in their past medical history.

Exclusion Criteria

Subjects who were exposed to hypersensitivity, hypertension, diabetes and other previously exposed respiratory diseases were excluded. Subjects who are exposed to any occupation and having respiratory problems have also been excluded.

Patient Consent Form

A voluntary consent form was signed by all the subjects before enrollment all the subjects were informed regarding the study purpose, benefits and harm of the study conducted.

Ethical Approval

The study was approved by institutional ethical committee and tertiary care hospitals.

Study Site

Study was conducted at department of general ward in an epidemiological region considering 300 sample size in a various tertiary care hospitals.

Study Duration

Study was carried out for the period of 18 months and 25 days.

Study Design: A single centered prospective study.

Study Material

A questionnaire section including questions were prepared based on the prospective study data format which are included in Table 1.

Data Analysis

The collected data were recorded in Microsoft excel sheet and the analysis SPSS (statistical package for social sciences) software was used.

OBSERVATION AND RESULTS

Educational Status of the Workers

Considering educational status of the workers belonging to primary section comprising 86 workers (28.6%), secondary section comprising 160 workers(53.3%) and tertiary section comprising 54 workers(18%). The secondary education workers were highly educated.

Occupational Status

Considering occupational status the wood workers were about 45 patients (15%), Hard rock workers were about 22 patients (7.33%), Concrete manufacturing workers were about 53 patients(17.6%), painters 13 patients(4.3%), Traffic police 30 patients(10%) Industrial based workers 15 patients(5%), Mining workers 35 patients(11.6%), Petrol bunk workers 16 patients(5.33%), Cloth dyeing 10 patients(3.33%), Flock workers 20 patients(6.66%), Rice mill workers 36 patients(12%), Textile industry workers 5 patients (1.66%).

Disease Condition of Patient

Considering disease status, occupationally asthma affected individuals 67 patients (22.3%), bronchitis (obliterans) 26 patients (8.66%), pneumoconiosis 21 patients (7%), COPD 52 patients (17.3%), Hypersensitivity 40 patients (13.3%), Eosinophilia 26 patients (8.66%), Mesothelioma 8 patients (2.66%), emphysema 23 patients (7.66%), frequent rhinitis 37 patients (12.3%).

Table 2: Showing II-6 Elevated.

Diseases	Number of patients	Frequency
Asthma	58	19.3
COPD	35	11.6
Pneumoconiosis	15	5
Emphysema	10	3.3

Table 3: Differential Count Changes Demonstration.

Parameters	Increased state	Number of patients	Frequency
Neutrophils	Asthma	58	19.3
Lymphocytes	Copd, mesothilioma, bronchitis	40	13.3
Eosinophils	Eosinophilia, pnuemoconiosis, frequent rhinitis hypersensitivity	15	5
Basophils	Emphysema	20	6.66

DISCUSSION

A total of 300 sample size was taken for conduct of study. The data was collected by interacting with the patients and analysed. The results revealed that out of the total cases in the study, majority of them were in age group of 50-60 years(47.3%) followed by 30-50 years(86%) and >50 years(4%). The gender distribution of the data revealed the majority of the cases were males 173 patients(57.6%) when compared to females 127 patients(42.3%). On study of domicile status majority of cases belongs to rural areas (57.3%) followed by urban(26%). When the occupational status of the case were analysed, the majority of them were concrete manufacture worker 53 patients (17.6%). The duration of the hospital stay of the patients were approximately 6-10 days (44%). The mean of the prospective study among the average of 200 samples determines the cause of the occupational Asthma, Mesothilioma, Frequent rhinitis, Emphysema, COPD were mainly due to organic dust toxic substances.

Table 4: Showing Demographics of Patients In Study.

Age	Number of patients	Frequency
18-20	30	10
20-40	86	28.6
40-60	142	47.3
>60	42	14
Sex		
Male	173	57.6
Female	127	42.3
Marietal status		
Married	206	68.6
Unmarried	94	31.33
Educational status		
Primary	86	28.6
Secondary	160	53.3
Tertiary	54	18
Nutritional status		
Poor	71	23.6
Average	190	63.3
Good	39	13
Hygenic condition		

Average	189	63
Good	68	22.6
Excellent	43	14.3

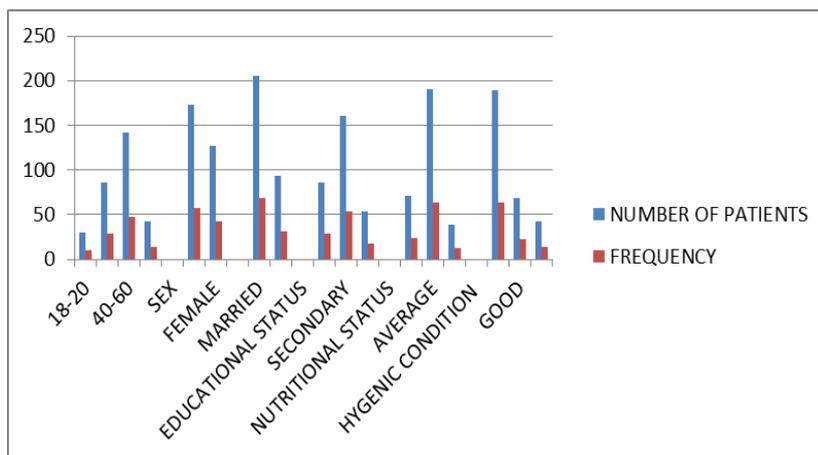


FIG-1:* Showing the statistical analysis of demographical data.

Table 5: Showing different patient selected from different occupations.

Occupations	Number of patients	Frequency
Wood Workers	45	15
Hardrock Miners	22	7.33
Concrete Manufacturing Workers	53	17.6
Painters	13	4.3
Traffic Police Officer	30	10
Industrial Based Workers	15	5
Mining Workers	35	11.6
Petrol Bunk Workers	16	5.33
Cloth Dyeing	10	3.33
Flock Workers	20	6.66
Rice Mill Workers	36	12
Textile Industrial Workers	5	1.66

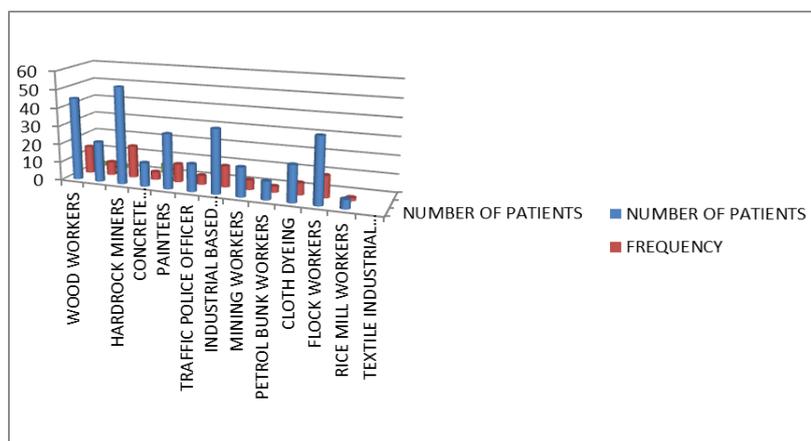
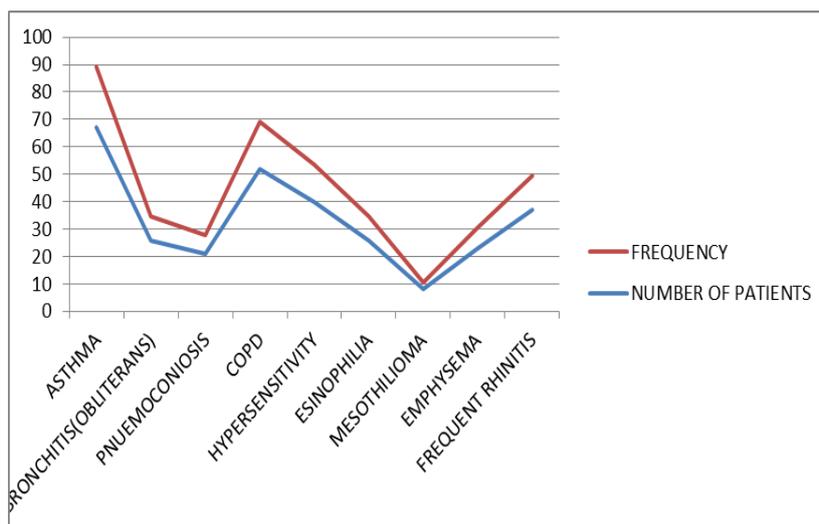


FIG-2* Showing statistical data of occupation v/s number of patients.

Table 6: Showing Different Diseased Conditions in Patients.

Diseased conditions	Number of patients	Frequency
Asthma	67	22.3
Bronchitis(obliterans)	26	8.66
Pnuemoconiosis	21	7
Copd	52	17.3
Hypersensitivity	40	13.3
Eosinophilia	26	8.66
Mesothilioma	08	2.66
Emphysema	23	7.66
Frequent rhinitis	37	12.3

**FIG 3: Showing statistical data of frequency of different occupational diseases in patients.**

CONCLUSION

A total of 300 sample size were analysed during the study period. The study results revealed that majority of patients were in the age group of 50-60 years. These shows that elder generation are mostly affected. Our study concludes that, majority of the patients were of poor economic status who were concrete manufacturing workers, wood workers and hard rock miners.

The outcome of study reveals that, decrease in exposure to organic dust decreases the symptoms. The results revealed that exposure of different age groups to various occupations having a deteriorating health effects on the respiratory system, which can be overcome by some preventive measures. We clinical pharmacists counseled them to use respiratory preventive equipments such as Disposable filter, full face mask, half mask, hoods and visors which barricade the organic dust toxic substance in subsidizing the hazardous symptoms.

ACKNOWLEDGE

We acknowledge the management of tertiary care hospitals for supporting the study. We also thank the patients for their valuable cooperation throughout the study.

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