

**EVALUATION OF RESPIRATORY MORBIDITY IN CARPET WEAVERS**Anshul Sharma<sup>1</sup>, Anupriya Deshpande<sup>2</sup>, Mahendra Khatri<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: BACKGROUND:** Occupation exposes an individual to certain hazards which are known as occupational diseases or pneumoconiosis. Carpet weavers are constantly exposed to dust in their workplace environment, posing a threat to their health. Spirometry is a readily available tool to measure pulmonary functions in the high risk group at an early stage which helps to take necessary measures to prevent further damage. **AIMS:** To study and compare the effects of long term dust exposure on pulmonary functions of carpet weavers with those of healthy subjects unexposed to such dust. **MATERIALS AND METHODS:** 50 adult female workers from carpet making industry were chosen for our study. 50 age and sex matched healthy subjects who were not exposed to excessive dust, enrolled as the controls. Forced expiratory spirometry was recorded by RMS Medspiror. Parameters such as forced vital capacity (FVC), forced expiratory volume in 1st second (FEV1), the ratio of FEV1/FVC, forced expiratory flow in the middle half of FVC (FEF25-75%), peak expiratory flow rate (PEFR) were assessed in both cases and controls. **STATISTICAL ANALYSIS:** The results were analyzed by using the student's unpaired t-test. **RESULTS:** Carpet weavers showed deterioration in FVC, FEV1, FEF25-75%, PEFR and FEV1/FVC ratio which was statistically highly significant ( $P < 0.001$ ), suggestive of obstructive respiratory disorder. **CONCLUSION:** Weavers are at risk of developing occupational lung disease which can be prevented by taking meticulous measures and creating health awareness among them.

**KEYWORDS:** Spirometry, Carpet weavers, PFT (Pulmonary function test).

**INTRODUCTION:** The textile industry is one of the largest economic sectors in our country. Carpet weaving is one of the rampant industries in and around Jaipur in which womenfolk are employed commonly. Weaving processes are done on two types of hand operated looms, desk-bench type and the one which involves manual operating of the pedals.<sup>1</sup> Textile workers are exposed to airborne particulate matter from natural and synthetic fibrous materials in their working environment.<sup>2</sup>

Several work specific and non-specific respiratory symptoms occur due to chronic exposure to cotton dust in textile industry.<sup>3</sup> Gram negative bacteria containing lipopolysaccharide in their outer wall often contaminate the cotton dust leading to various pulmonary manifestations.<sup>4</sup> Appreciable amount of dust is produced during weaving of these carpets, resulting in respiratory ailments.<sup>5</sup>

Carpet weaving is a major source of living for the people as it requires only the basic facilities to weave carpets like a loom, wool and basic weaving tools. Often, carpets are woven at homes in which womenfolk in rural areas get involved. While it takes few weeks' time to learn carpet weaving, it takes years together to master the skill.<sup>6</sup> Dust is constellation of the tiny particles dispersed in air due to mechanical disintegration of materials by impulsive forces such as crushing, grinding, milling etc.<sup>7</sup>

**MATERIALS AND METHODS:** The present study was conducted in NIMS, Jaipur during the year 2013 to 2014 after obtaining ethical committee clearance. This study was undertaken to observe the effects

## ORIGINAL ARTICLE

of chronic exposure to carpet dust on the pulmonary functions of adult female workers of age group 20-50 years. Fifty workers who were involved in carpet weaving for more than three years volunteered for the study. Fifty age matched women from common population who were not exposed to constant dust were enrolled as control group. The study groups and control groups were matched for age, height, weight and Body Mass Index [BMI].

**INCLUSION AND EXCLUSION CRITERIA:** The study was undertaken in 50 healthy female subjects employed in carpet weaving, age ranging from 20 to 50 years. It was made sure that we enrolled only those workers who worked for at least 7-8 hours a day for 6 days a week. 50 apparently healthy females were taken as controls for the study. We matched the subjects and controls for age, height and weight. Subjects with thoracospinal abnormalities, diabetes mellitus, hypertension, pulmonary tuberculosis, bronchial asthma, chronic obstructive pulmonary disease and other respiratory diseases were excluded from the study.

Both the subjects and the controls gave voluntary consent for the study. History was taken in detail and a systemic clinical examination was done meticulously to exclude medical problems. BMI was calculated from the Height (mt) and weight (kg) of the subjects.

Computerized spirometer [RMS Medspiror] was used to perform spirometry. Test procedure was explained and demonstrated to the subjects before commencing the maneuver. The subject performed the maneuver in upright position and repeated it three times with adequate rest in between the maneuver. The best maneuver among the three attempts was selected.

### RESULTS:

Age in years	Carpet weavers (n)	Controls (n)
20-30	32	30
31-40	12	15
41-50	6	5
<b>Total</b>	<b>50</b>	<b>50</b>

**TABLE 1: Age wise distribution of carpet weavers and controls**

Basic characteristics	Weaver (n = 50)	Controls (n = 50)	Significance	
			t-value	p-level
Age in years	36.8 ± 6.1	34.1 ± 7.8	1.68	0.10
Height (cm)	156.4 ± 6.4	161.8 ± 0.9	0.90	0.37
Weight (kg)	55.72 ± 6.26	57.52 ± 7.15	0.60	0.55
BSA (sqm)	1.58 ± 0.09	1.60 ± 0.19	1.35	0.18
BMI (kg/m <sup>2</sup> )	22.33 ± 3.05	23.70 ± 2.63	0.65	0.52

**TABLE 2: Anthropometric characteristics of Subjects and Controls**

All values are expressed as Mean ±SD. (p>0.05: not significant)

## ORIGINAL ARTICLE

Parameters	Carpet weavers	Controls	P value
FVC	2.01±0.24	3.25±0.42	P<0.001*
FEV1	1.44±0.25	3.82±0.45	P<0.001*
FEV1/FVC	70.2±12.6	85.8±5.9	P<0.001*
FEF25%-75%	3.65±1.45	4.81±1.03	P<0.001*
PEFR	4.58±2.02	6.24±1.62	P<0.001*

**TABLE3: Comparison of PFT between carpet weavers and controls**

All values are expressed as Mean ± SD. \* indicates highly significant value.

**DISCUSSION:** The advent of pulmonary function tests have opened a new era towards the scientific approach in diagnosis and timely management of bronchopulmonary disorders. Other studies have concluded that persistent cough, expectoration, backache, common colds and joint pains were the most frequent health complaints among adult carpet weavers.<sup>8</sup> Many studies have been done in relation to pulmonary functions both in normal subjects and in workers exposed to different occupational dust hazards. With a progressive trend towards industrialization, there is a definite increase in occupational lung diseases in India.

Psychosocial risks and work related stress are common in carpet weavers in developing countries like India. Textile industry in India is a poorly organized sector, mostly run by private organizations. Additionally, there is a lack of awareness in the rural folks employed in this industry.<sup>9</sup>

Results of our study revealed greater respiratory symptoms and lower pulmonary function test parameters in carpet weavers as compared to controls, indicating the effect of chronic dust exposure on the respiratory functions of our subjects. Allergic symptoms were also more encountered by the subjects than the controls. Several previous studies have demonstrated increased respiratory and allergic symptoms among weavers, thus supporting the results of our study.

The mean values of pulmonary function parameters, FVC, FEV1, FEF25-75%, FEV1/FVC, PEFR in carpet weavers were seen to be significantly lowered as compared to controls. Our study reveals the ill effects of chronic wool dust exposure in women working in carpet industries thus throwing light on occupational health. Reduction in FVC, FEV1, and FEV1/FVC is suggestive of an obstructive pattern of pulmonary disorder.

Lung functions were lower in cotton workers than in general population and in those with history of byssinosis.<sup>10</sup> Inhalation of dust is an important causative factor of interstitial lung disease in our country.<sup>11</sup>

Studies have shown that cotton dust induces histamine release or brings about an immunological reaction involving antigen antibody reaction. It is also documented in certain literatures that endotoxin is the principle mediator of byssinosis and occupational lung disorders.<sup>12,13,14</sup>

**CONCLUSION:** The carpet industry is a high risk occupation to develop various types of respiratory disorders and their complications. The poor environmental conditions coupled with unhygienic conditions have been found the reasons for developing such types of disorders. Lack of awareness among the weavers deteriorates already existing problems in the carpet industry. Most of these

## ORIGINAL ARTICLE

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diseases and health problems found in carpet industry can be avoided by proper precautions and care. There must be some provision of protecting equipment's e.g. face masks, first aid facility, gloves and proper uniform for the protection of workers.

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## ORIGINAL ARTICLE

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