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To study the pulmonary function in a group of handloom weavers working in registered societies at Warangal district, A.P. by spirometry

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ABSTRACT

In this study which included 154 handloom weavers registered as Handloom weavers at different societies of which males are 128 and females are 26 randomly underwent Spirometry by Medspiror. Before undergoing Spirometry detailed history of each person was obtained according to the proforma and all persons were clinically examined. Pulmonary tuberculosis, congestive heart disease, Rheumatic heart hypertension and diabetes mellitus were excluded. Each person's data and along with FVC, $FEV_{1,}$ $FEF_{25-75\%,}$ PEFR and FEV_1/FVC parameters of pulmonary function test fed into the computer and analyzed and compared with the Indian studies done on healthy persons. It was observed that, all the Pulmonary Function Test values showed low values as compared to the Indian studies.

Keywords: Spirometry, Pulmonary function test, Airway Resistance, Maximum Expiratory Flow rate, Breathlessness, Peak Expiratory Flow rate, Smoking, Bronchial Asthma, Weavers

Introduction

Exposure to organic dusts is widely encountered in many industries, agricultural work and the general environment. The process of various agricultural products such as cotton, flax, hemp, grains, tobacco, paprika and tea is often associated with exposure to organic dust. In case of textile workers, exposure to cotton dusts occurs during bale opening blowing, carding, spinning and weaving Exposure to vegetable dusts may also occur when plants are processed at home, as often happens in some developing countries. Vegetable dust may be defined as an aerosol derived from plant material, regardless of the nature of the particles or circumstances of their emission into the air. Thus the term vegetable dusts include all dusts formed in the handling and processing of vegetable materials in industry and agriculture. When inhaled an aerosol, vegetable dusts may exert a variety of harmful effects on the respiratory system. The absorption of substances from vegetable dusts on the surfaces of airways or in the alveoli may lead to four main types of responses. The first type is an allergic (atopic) response that occurs either in the upper airways (hay fever) or in the bronchi (Asthma) or in both. The second type of response is Byssinosis - a disease with characteristic symptoms of chest tightness and or a shortness of breath on returning to work after an absence. Sufferers from byssinosis may eventually develop permanent respiratory disability. Byssinosis occurs among cotton and other textile workers all over the world. The third type involves immunological changes in the Lung parenchyma which may become irreversible after prolonged exposure. The respiratory diseases [1] caused by this type of response are collectively known as extrinsic allergic pneumonitis or hypersensitivity pneumonitis. The best known and most widely studies are farmers' lung and Bagasse pneumonitis. This study aims to know the pulmonary function status in a group of handloom weavers who are registered at different

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societies in Warangal District working either at their houses or in the societies by Spirometry.

1. **Aim of the study:** To Study the pulmonary function in a group of Handloom Weavers working in registered Societies at Warangal District, A.P. by Spirometry.
2. **Materials & methods:** Spirometry is performed in these handloom weavers at each society area by Medispiror, an Electronic Spirometer which is operated by Electricity power. The person is explain in detail about the procedure and a minimum of three to four recording are taken and among them the best of two successive recordings not varying by 5% are taken into consideration. In the present study Spirometry was done while person sitting on a table. In Gujarat Study Spirometry was carried on Spiro check in standing position. Body position also effects Spiro metric volumes, particularly Functional Vital Capacity (FVC) and Vital Capacity (VC) which are 7 to 8% lower in the supine than in the standing and 1 to 2% lower in the sitting than in the standing position. These handloom weavers working in 15 different registered weaving Societies in the Warangal District are screened. These Weaving societies are located at different areas in the Warangal. Each day one area in screened and all areas are covered over a period of 15 days. Before performing Spirometry detailed history of these weavers is taken including duration of occupation, type of occupation, symptoms and associated conditions. Persons having the history of pulmonary tuberculosis, Diabetes mellitus, and Congestive Heart failure are excluded. History of bronchial asthma and allergic Rhinitis in this person are taking into consideration to know their associations with this group of people for the diagnosis of diseases of the chest[2]
3. **Statistical analysis & descriptive values:** Pulmonary functions by Spirometry were studied in Handloom Weavers after collecting data from each person. This data is fed into the computer and analysed by the Statistician. In this study 154 handloom weavers underwent Spirometry, [3]Out of which 128 are males of which 83 are smokers and 45 non smokers and 26 are females of which 1 smoker and 25 are non smokers as shown in the Table No.1

Table 1: Distribution of Handloom Weavers by Sex and Smoking Habits

Smoking Habits	Male	Female	Total
Smokers	83	1	84
Non-Smokers	45	25	70
Total	128	26	154

In this study most of them are males among them most of them are smokers. According to the age in years Handloom Weavers are grouped into 7 groups. Majority of the Handloom weaver are between 40-60 years of age as shown in Table No.2

Table 2: Distribution of Handloom Weavers by Age in Years

Age in Years	Male	Female	Total
0-20	2	1	3
21-30	12	4	16
31-40	22	11	33
41-50	36	7	43
51-60	38	2	40
61-70	17	1	18
71-80	1	0	1
Total	**128**	**26**	**154**

Handloom weavers are grouped into 6 groups by weight in Kg [6]. Most of them fall under the group of 31-50 Kgs. Most of the male & female fall in the group of 31-50 kgs as shown in the Table No.3

Table 3: Distribution of Handloom Weavers by Weight in Kgs and Sex

Age in Years	Male	Female	Total
20-30	3	1	4
31-40	39	11	50
41-50	56	9	65
51-60	18	5	23
61-70	9	0	9
71-80	3	0	3
Total	**128**	**26**	**154**

Handloom Weavers are grouped into 6 groups by Height in Cm[6]. Most of them fall in the group of 151-160cm. Most of the Males fall in the group of 151-160 cm and females in the group of 141-150 as shown in the Table No.4.

Table 4: Distribution of Handloom Weavers by Height in Cms. &Sex

Height in Cms	Male	Female	Total
131-140	1	4	5
141-150	11	15	26
151-160	79	7	86
161-170	34	0	34
171-180	3	0	3
Total	128	26	154

According to the duration of Occupation (Exposure) in years handloom weavers are grouped into 6 groups. Most of the Handloom Weavers have a duration of employment of 11-30years as handloom weavers as shown in Table No.5.

Table 5: Distribution of Handloom Weavers by Duration of Employment in Years & Sex

Duration of Employment in Yrs	Male	Female	Total
0-10	19	6	25
11-20	29	12	41
21-30	27	7	34
31-40	22	1	23
41-50	27	0	27
51-60	4	0	4
Total	128	26	154

Out of 154, 21 weavers give the history of Bronchial Asthma of which 15 are males and 6 are females. 14% of the Handloom weavers [5] gave the history of Bronchial Asthma. Out of 21 Asthmatics 9 are smokers and 12 are non-smokers as shown in the Table No. 6

Table 6: Distribution of Handloom weavers by Bronchial Asthma, Sex and Smoking Habits

	Smokers			Non Smokers		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
Non-Bronchial Asthma	42	19	61’	71	1	72
Bronchial Asthma	3	6	9	12	0	12
Total	45	25	70	83	1	84

Most of them have Breathlessness [4] as predominant symptom. Among males predominant symptom is breathlessness and among females predominant symptom is breathlessness as shown in Table No. 7.

Table 7: Prevalence of Respiratory Symptoms by Sex in Handloom weavers

Respiratory Symptoms	Male	Female	Total
No Cough	59	19	78
Cough	68	7	75
No Breathlessness	57	12	69
Breathlessness	71	14	85
No Chest pain	124	25	149
Chest Pain	4	1	5
No Tightness of Chest	43	9	52
No Wheeze	85	16	101
Wheeze	43	10	53

Table 8: Distribution of Ventilator Lung function of Handloom Weavers by Age Group, Sex & Smoking Habits [7]

Age in group	Smoking Habits	FVC				FEV_1			PEFR			$FEF_{25.75\%}$			FEV_1/FVC		
		No.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
15-19	Smokers	No.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000
		SD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000
	Non Smokers	No.	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1
		Mean	2.30	0.000	2.30	2.30	0.000	2.30	8.50	0.000	8.50	3.68	0.00	3.68	1.00	0.000	1.00
		SD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000
20-24	Smokers	No.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000
		SD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0	0.000	0.000	0.000	0.000

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	Non Smokers	No.	5	1	6	5	1	6	5	1	6	5	1	6	5	1	6
		Mean	1.80	1.34	1.73	1.80	1.34	1.73	5.80	4.60	5.60	3.38	3.21	3.18	1.00	1.00	1.00
		SD	0.28	0.00	0.31	0.28	0.00	0.31	0.68	0.00	0.70	0.56	0.00	0.67	0.00	0.00	0.00
25-34	Smokers	N0.	3	0	3	3	0	3	3	0	3	3	0	3	3	0	3
		Mean	1.46	0.00	1.46	1.37	0.00	1.37	5.00	0.00	5.00	2.79	0.00	2.79	0.93	0.00	0.93
		SD	0.20	0.00	0.20	0.26	0.00	0.26	0.00	0.00	0.00	1.12	0.00	1.12	0.05	0.00	0.00
	Non Smokers	No.	13	5	18	13	5	18	13	5	18	13	5	18	13	5	18
		Mean	1.83	1.14	1.64	1.76	1.14	1.59	6.55	3.36	5.66	3.07	1.98	2.77	0.97	1.00	0.98
		SD	0.38	0.16	0.46	0.34	0.16	0.41	2.45	0.82	2.56	1.27	0.58	1.22	0.08	0.00	0.07

Age in gro	Smoking Habi	FVC				FEV_1			PEFR			$FEF_{25.75\%}$			FEV_I / FVC		
		No.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
35-44	Smokers	No	11	0	11	11	0	11	1	0	11	1	0	U	1	0	1
		M	1.67	0.00	1.67	1.17	0.00	1.17	3.73	0.00	3.73	1.54	0.00	1.54	0.77	0.00	0.77
		S	0.66	0.00	0.66	0.36	0.00	0.36	1.96	0.00	1.96	1.00	0.00	1.40	0.26	0.00	0.26
	Non Smokers	No.	10	14	24	10	14	24	10	14	24	10	14	24	10	14	24
		M	1.82	1.07	1.38	1.79	0.79	1.21	5.93	3.46	4.46	2.92	1.21	1.92	0.98	0.84	0.90
		S	0.35	0.54	0.60	0.35	0.25	0.57	2.46	1.15	2.20	1.06	0.75	1.23	0.23	0.25	0.21
45-54	Smoker	No	26	0	26	26	0	26	2	0	23	2	0	26	2	0	2
		M	1.31	0.00	1.31	1.18	0.00	1.18	3.76	0.00	3.76	1.44	0.00	1.44	0.89	0.00	0.89
		S	0.41	0.00	0.41	0.45	0.00	0.45	1.91	0.00	1.91	0.81	0.00	0.81	0.16	0.00	0.16
	Non Smokers	No	10	4	14	10	4	14	9	3	12	1	4	14	1	4	1
		M	1.31	0.72	1.14	1.23	0.72	1.08	4.89	1.93	4.15	1.79	0.95	1.56	0.95	0.99	0.96
		SD	0.48	0.25	0.50	0.45	0.25	0.47	1.19	0.78	1.69	0.70	0.35	0.73	0.10	0.01	0.09

55-72	Smokers	No	43	1	44	43	1	44	41	0	41	43	1	44	43	1	44
		M	1.22	0.90	1.21	1.02	0.18	1.00	3.11	0.00	3.11	1.16	0.20	1.13	0.87	0.20	0.86
		SD	0.45	0.00	0.45	0.29	0.00	0.31	1.46	0.00	1.46	0.60	0.00	0.61	0.16	0.00	0.19
	Non Smokers	No	6	1	7	6	1	7	6	0	6	6	1	7	6	1	7
		M	1.05	0.50	0.97	0.97	0.46	0.90	3.05	0.00	3.05	1.21	0.38	1.09	0.94	0.92	0.94
		SD	0.32	0.00	0.35	0.26	0.00	0.30	1.15	0.00	1.15	0.45	0.00	0.48	0.07	0.00	0.06
TOTAL	Smokers	No	83	1	84	83	1	84	78	0	78	83	1	84	83	1	84
		M	1.31	0.90	1.31	1.10	0.18	1.09	3.46	0.00	3.46	1.35	0.20	1.34	0.87	0.20	0.86
		SD	0.49	0.00	0.49	0.37	0.00	0.38	1.70	0.00	1.72	0.89	0.00	0.90	0.18	0.00	0.19
	Non Smokers	No	45	25	70	45	25	70	44	23	67	4	25	70	4	25	7
		M	1.62	1.01	1.40	1.56	0.86	0.31	5.56	3.26	4.76	2.56	1.33	2.12	0.97	0.91	0.94
		SD	0.49	0.46	0.56	0.49	0.29	0.54	2.27	1.16	2.24	1.21	0.77	1.22	0.07	0.20	0.14

M=Male;F=Female;T=Total;SD=Standard Division

From this table, it is observed that the pulmonary function test parameters decrease with the increase in age. Within the same age group also pulmonary function test parameters are lower in smokers when compared to non smokers. In females pulmonary function test parameters are lower when compared to males with in the same age group.

Table 9: Distribution of Ventilatory Long function of Handloom Weavers by Duration of Employment as Handloom Weavers in Years

Duration of Employment	FVC				FEV_I			PEFR			$FEF_{25-75\%}$			FEV_I / FVC		
	No.		F	T	M	F	T	M	F	T	M	F	T		F	T
0-10	No.	19	6	25	19	6	25	18	5	23	19	6	25	19	6	25
	M	1.7	0.9	1.5	1.6	0.85	1.49	6.3	2.90	5.60	2.9	1.2	2.51	0.95	089	0.9
	SD	0.9	0.2	0.5	0.5	0.35	0.59	2.3	1.01	2.5	1.4	0.7	1.53	0.13	0.2	0.1
11-20	No.	29	12	41	29	12	41	27	122	39	29	12	41	29	12	41
	M	1.6	1.2	1.5	1.4	0.96	0.28	4.8	3.50	4.40	2.0	1.4	1.85	0.90	0.8	0.8
	SD	0.5	0.5	0.5	0.4	0.22	0.43	1.6	1.02	1.62	1.1	0.8	1.10	0.17	0.2	0.2
21-30	No.	27	7	34	27	7	34	27	6	33	27	7	34	27	7	34
	M	1.4	0.7	1.2	1.1	0.70	1.09	3.8	3.00	3.70	1.6	1.2	1.59	0.88	0.9	0.9

	SD	0.52	0.28	0.56	0.44	0.28	0.46	2.24	1.38	2.13	1.89	0.60	0.87	0.21	0.02	0.19
31-40	No.	22	1	23	22	1	23	19	0	19	22	1	23	22	1	23
	M	1.2	0.9	1.2	1.0	0.18	1.05	3.6	0.00	3.60	1.3	0.2	1.30	0.90	0.2	0.8
	SD	0.4	0.0	0.4	0.4	0.00	0.46	1.9	0.00	1.96	0.9	0.0	0.98	0.14	0.0	0.2
41-50	No	27	0	27	2	0	27	2	0	2	2	0	2	2	0	2
	Mea	1.19	0.00	1.19	1.06	0.00	1.06	3.20	0.00	3.20	1.28	0.00	1.28	0.91	0.00	0.91
	SD	0.3	0.0	0.3	0.2	0.00	0.28	1.4	0.00	1.45	0.6	0.0	0.63	0.10	0.0	0.1
51-60	No	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4
	M	1.0	0.0	1.0	0.9	0.00	0.91	3.7	0.00	3.70	0.9	0.0	0.95	0.88	0.0	0.8
	SD	0.24	0.00	0.24	0.21	0.00	0.21	1.48	0.00	1.48	0.32	0.00	0.32	0.09	0.00	0.09
TOTAL	No	128	2	154	128	26	154	122	2	14	128	2	15	128	2	154
	M	1.4	1.0	1.3	1.2	0.83	1.19	4.2	3.26	4.06	1.7	1.2	1.69	0.90	0.8	0.9
	SD	0.51	0.45	0.53	0.47	0.32	0.47	2.18	1.16	2.08	1.17	0.78	1.13	0.16	0.24	0.17

M=Male; F=Female; T=Total; SD=Standard Deviation

Table 10: Distribution of Ventilatory Long function of Handloom Weavers by Duration of Employment in Yrs, Sex, and Smoking Habits

Duration of Employment	Smoking Habits	FVC				FEV_1			PEFR			$FEF_{25,7}$			FEV_1/ FVC		
		No.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
0-10	Smokers	N	5	0	5	5	0	5	4	0	4	5	0	5	5	0	5
		M	1.43	0.00	1.43	1.20	0.00	1.20	4.93	0.00	4.93	1.18	0.00	1.1	0	0	0.82
		S	0.50	0.00	0.50	0.57	0.00	0.57	2.23	0.00	2.23	0.94	0.00	0.9	0	0	0.19
	Non Smokers	N	14	6	20	14	6	20	14	5	19	1	5	1	1	6	20
		M	1.87	0.94	1.59	1.84	0.85	1.56	6.70	2.86	5.69	3.53	1.24	2.8	0	0	0.96
		S	0.32	0.28	0.53	0.32	0.35	0.57	2.25	1.01	2.62	1.11	0.79	1.4	0	0	0.12
11-20	Smoker	N	12	0	12	12	0	12	10	.	10	1	0	1	12	0	12
		M	1.50	0.00	1.50	1.15	0.00	1.15	4.00	0.00	4.00	1.55	0.00	1.5	0	0	0.83
		S	0.69	0.00	0.69	0.36	0.00	0.36	1.22	0.00	1.22	1.23	0.00	1.2	0	0	0.24
	Non Smokers	N	17	12	29	17	12	29	17	1	29	1	12	2	17	1	29
		M	1.71	1.23	1.51	1.60	0.96	1.34	5.24	3.54	4.53	2.35	1.45	1.9	0	0	0.91
		SD	0.38	0.50	0.49	0.36	0.22	0.44	1.76	1.02	1.71	0.98	0.82	1.02	0	0	0.18
	Smo	N	18	0	18	18	0	18	18	0	18	1	0	1	18	0	18

30	kers	M	1.43	0.00	1.43	1.09	0.00	1.09	3.04	0.00	3.04	1.44	0.00	1.4	0	0	0.83
		S	0.49	0.00	0.49	0.33	0.00	0.33	1.56	0.00	1.56	0.81	0.00	0.8	0	0	0.24
	Non Smo kers	N	9	7	16	9	7	16	9	6	15	9	7	1	9	7	16
		M	1.40	0.71	1.10	1.37	0.70	1.08	5.30	3.02	4.39	2.19	1.20	1.7	0	0	0.99
		S D	0.57	0.28	0.58	0.55	0.28	0.56	2.59	1.38	2.46	0.89	0.60	0.8 9	0 .	0 .	0.03

Duration of Employe	Smoking habits	FVC				FEV_I			PEFR			$FEF_{25.75\%}$			FEV_I / FVC		
		No.	M	F	T	M	F	T		F	T	M	F	T		F	T
31 - 40	Smokers	N	21	1	22	21	1	2	19	0	1	21	1	22	21	1	22
		M	1.25	0.90	1.23	1.1.	0.18	1	3.59	0.00	3.59	1.39	0.20	1.34	0.90	0.20	0.87
		S	0.42	0.00	0.41	0.42	0.00	0	1.96	0.00	1.96	0.97	0.00	0.96	0.14	0.00	0.20
	Non Smokers	N	1	0	1	1	0	1	0	0	0	1	0	1	1	0	1
		M	0.50	0.00	0.50	0.48	0.00	0	0.00	0.00	0.00	0.39	0.00	0.39	0.96	0.00	0.96
		SD	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41 - 50	Smoker	N	23	0	23	23	0	2	23	0	2	23	0	23	23	0	23
		M	1,2	0.00	1.21	1.07	0.00	1	3.14	0.00	3.14	1.26	0.00	1.26	0.91	0.00	0.91
		S	0.38	0.00	0.38	0.28	0.00	0	1.51	0.00	1.51	0.66	0.00	0.66	0.10	0.00	0.10
	Non Smokers	N	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4
		M	1.11	0.00	1.11	1.01	0.00	1	3.43	0.00	3.43	1.37	0.00	1.37	0.92	0.00	0.92
		SD	0.34	0.00	0.34	0.28	0.00	0 .	1.04	0.00	1.04	0.38	0.00	0.38	0.08	0.00	0.08
51 - 60	Smokers	N	4	0	4	4	0	4	4	0	4	4	0	4	4	0	4
		M	1.04	0.00	1.04	0.91	0.00	0	3.73	0.00	3.73	0.95	0.00	0.95	0.88	0.00	0.88
		SD	0.24	0.00	0.24	0.21	0.00	0 .	1.48	0.00	1.48	0.32	0.00	0.32	0.09	0.00	0.09
	Non Smokers	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		SD	0.00	0.00	0.00	0.00	0.00	0 .	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	Smokers	N	83	1	84	83	1	8	78	0	7	83	1	84	83	1	84
		M	1.31	0.90	1.31	1.10	0.18	1	3.46	0.00	3.46	1.35	0.20	1.34	0.87	0.20	0.86
		SD	0.49	0.00	0.49	0.37	0.00	0 .	1.70	0.00	1.72	0.89	0.00	0.90	0.18	0.00	0.19
	Non Smokers	N	45	25	70	45	25	7	44	23	67	45	2	70	45	25	70
		M	1.62	1.01	1.40	1.56	0.86	0	5.56	3.26	4.76	2.56	1.33	2.12	0.97	0.91	0.94
		SD	0.49	0.46	0.56	0.49	0.29	0 .	2.27	1.16	2.24	1.21	0.77	1.22	0.07	0.20	0.14

M=Male; F=Female; T=Total; SD=Standard Deviation

From this table it is observed that the pulmonary function test parameters decrease with the increase in the duration of employment. Within the same duration of Employment, pulmonary function test parameters are lower in smokers when compared to non-smokers.

Table 11: Distribution of Ventilator Long function of Handloom Weavers by Sex, and Smoking Habit

		FVC			FEV_I			PEFR			FEF25.75%			FENT, / FVC		
	No.	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Smokers	No.	83	1	84	83	1	84	78	0	78	83	1	84	83	1	84
	Mean	1.31	0.90	1.31	1.10	0.18	1.09	3.46	0.00	3.46	1.35	0.20	1.34	0.87	0.20	0.86
	SD	0.49	0.00	0.49	0.37	0.00	0.38	1.72	0.00	1.72	0.89	0.00	0.90	0.18	0.00	0.19
Non Smokers	No.	45	25	70	45	25	70	44	23	67	45	25	70	45	25	70
	Mean	1.62	1.01	1.40	1.56	0.86	1.31	5.50	3.23	4.76	2.55	1.33	2.12	0.97	0.91	0.94
	SD	0.49	0.46	0.56	0.49	0.29	0.54	2.27	1.16	2.24	1.21	0.77	1.22	0.07	0.20	0.14
TOTAL	No.	128	26	154	128	26	154	122	23	145	128	26	154	128	26	154
	Mean	1.42	1.01	1.36	1.26	0.83	1.19	4.21	3.26	4.06	1.78	1.28	1.69	0.90	0.88	0.90
	SD	0.51	0.45	0.53	0.47	0.32	0.47	2.18	1.16	2.08	1.17	0.78	1.13	0.16	0.24	0.17

M=Male; F=Female; T=Total; SD=Standard Deviation

An attempt is made to compare mean and SD values of all pulmonary function parameters for different age groups by sex. This was done with the view to make comparative study with Gujarath, Kamat *et al*., and Omprakash studies[8]. The Averages were compared with those of Kamat *et al*., (South Indian), Omprakash(Karnataka) and Gujarath studies as shown in the Table No.12 depending on Respiratory physiology[3].

Table 12 : Comparison with other Studies

Age in Years		FEV_1		FVC		FEV_i%	
		Male	Female	Male	Female	Male	Female
15 to 19	K	3.04	2.08	3.49	2.45	87.1	85.4
	0	3.24	2.46	3.67	2.68	88.0	92.0

	G	2.41	1.94	2.74	2.20	88.1	87.9
	P	2.30	0.00	2.30	0.00	100	0.00
20 to 24	K	3.09	3.09	3.65	2.42	4.6	86.0
	0	3.24	2.40	3.60	2.67	87.0	88.0
	G	2.52	1.80	2.85	2.05	88.2	87.8
	P	1.80	1.34	1.80	1.34	100	100
25 to 34	K	2.90	1.95	3.59	2.39	80.6	84.5
	0	3.20	2.15	2.60	2.67	86.0	87.0
	G	2.48	1.62	2.80	1.84	88.7	88. 1
	P	1.76	1.14	1.83	1.14	97.0	100
35 to 44	K	2.60	1.95	3.31	2.24	78.4	82.9
	0	2.80	1.86	3.30	2.20	84.0	86.0
	G	2.53	1.65	2.85	1.86	88.7	88.3
	P	1.79	0.79	1.82	1.07	98.0	84.0
45 to 54	K	2.42	1.,64	3.14	1.98	77.4	84.0
	0	2.34	1.74	2.92	2.05	80.0	86.0
	G	2.46	1.56	2.78	1.77	88.6	88.6
	P	1.23	0.72	1.31	0.72	0.95	0.99
>55	K	2.35	1.23	2.98	1.40	78.9	87.0
	0	2.14	1.39	2.70	1.68	80.0	83.0
	G	2.07	1.34	2.36	1.54	87.9	87.3
	P	0.97	0.96	1.05	0.50	94.0	92.0

K=Kamatet.Al., (South Indian)[7] ; O=Omprakash[8] (Karnataka),P=President Study

The FEV1, fev and FEV1% of this study within the same age group are lower when compared to that of Kamat et al., Omprakash and Gujarath Studies.An attempt was also made to compare the PEFR[9] values of the present study with those of Gujarath study, Malik *et. al*., (NI) and Kamat *et. al*., (SI) as shown in the Table No. 13.

Table 13: Comparison of PEFR with other studies

Sex	Age	PR	G	SI	NI
Male	15-19	760±87	517±82	487±80	442±58
	20-24	658±2.51	527±68	502±68	482±64
	25-29	534	507±70	506±77	486±68
	32-34	409	509±66	505±74	475±67
	34-44	322	484±61	497±106	435±72
Female	15-19	460	413±59	368±58	322±45
	22-24	293	400±52	374±62	327±61
	25-29	316	377±31	342±26	352±33
	>30	377	36635	320±71	301±45

PR=Present Study, G-Gujarat, SI, South India, NI=North India

The average PEFR values of the present study correlated well with the South Indian Gujarat Studies. North Indian PEFR values are quite low.

Discussion

In this study which included 154 Handloom weavers registered at different societies of which males are 128, females are 26 randomly selected and underwent Spirometry by Medspiror. Mean values of all pulmonary function test parameters are studies and compared with Indian studies [10] All the pulmonary function test parameters were significantly lower as compared to Indian Studies as shown in Table No.12. This observation is probably due to body built, nutrition, physical activity socio-economic status, poor understanding of the procedure due to illiteracy, Race, Ethnic difference and geographical distribution with reference to altitude and climate. This result was in consistence with the generalization that the preliminary pulmonary parameters vary with different ethnic and racial groups and also at different geographical distribution with reference to altitude and climate. In this study it was observed that all the pulmonary function test parameter showed fall with increasing age and the Pulmonary Function Test values [11] were maximum at the age of 20 years. This observation correlated well with the South Indian study and Karnataka Study as shown in the Table No. 12. This observation was in consistence with the generalization that the pulmonary function parameters increase with the age from the Neonatal period to adulthood and then decrease with aging. This is due to increase in lung recoil and chest recoil from the birth to adulthood and then decrease in chest recoil and lung recoil with aging and also due to age related disease. Therefore age is the important host factors responsible for inter individual variation in lung function which account for approximately 5% of the variation in adults. Comparing the FVC and FEV1 values of the present study with those of South Indian study, Omprakash study and Gujarat Study, it was observed that the FVC & FEV1 averages were lower than the other studies within the same age group. This observation is probably due to:

1) Instrument Variability
2) Method Of Performing The Spirometry:
3) Altitude variation and Climate
4) Nutrition.
5) Physical Built
6) Socio-Economic Status
7) Exposure to cotton Dust.
8) Most of the people are not educated well and they entered this occupation in handloom weavers at an early age in childhood.

Comparing the Pulmonary Function Test values of Smoker with that of non-smoker within the same age group, it was observed that FVC, FEV1 and FEF25-75% and PEFR[13] values were significantly lower in smoker than in non smokers. It was also observed that the Pulmonary Function Test values among the smokers within the same duration of employment were lower compared to that of non smokers. It were also observed that the Pulmonary Function Test[12] values among the smokers decline more with the increase in the duration of Employment as compared to that of non smokers. These observations were probably due to the smoking habits which cause rapid decline in Pulmonary Function Test with increasing age and also these people were exposed to cotton dust. Therefore, smoking habits and exposure to cotton dust have an additive effect on the rapid decline in Pulmonary Function Test values with increasing age and also with increasing duration of employment. In one study, the life time loss of FEV_1[14] for the average male smokers was 7.4 ml. per back year and for the average female smokers it was 4.4ml per pack-year.

Conclusion

In this study of 154 Handloom Weavers by Spirometry it was observed that

1) All the Pulmonary Function Test parameters were significantly lower compared to normal Healthy Indian Studies and Western Studies.
2) All the Pulmonary Function Test parameters showed lower values among smoker as compared to non smokers.
3) About 14% of these people gave the history of bronchial asthma and about 9% of the people gave the history of allergic rhinitis.
4) Among the smoking handloom weavers cough was the predominant symptom. Among nonsmoker handloom handloom weavers breathlessness was the predominant symptom.
5) All the pulmonary Function Test parameters[15] decline with increasing duration of employment probably due to increasing age, dust exposure and smoking habits. The present study support the need to establish normal values in men and women in any previous untested ethnic or geographical group before interpretations are made about prevalence of lung dysfunction relating to disease. The ethnic variation of men and women may also be different.

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