

Pulmonary functions of Workers enrolled in constructive, food and petrol industries in Karbala province, 2013

Hieder Mohammad Hasan Al- Attar

Saad Ibrahim Algaban


Hasan Alwan Baiee

Introduction

- PFT can be used in the primary, secondary, and tertiary prevention of occupational and non-occupational respiratory diseases and in the maintenance of workers' fitness .
- The health risk associated with a dusty job depends on the type of dust (physical, chemical characteristics), the exposure which determines the dose , and exposure time (the duration).

Introduction

Lung function tests are used as a routine procedure for assessing and monitoring the respiratory disease. Pulmonary function tests are used to aid diagnosis, **assess functional impairment** and monitor treatment or progression of diseases. [




Spirometry data collected as a result of either mandatory testing, or respiratory evaluation programs, provide a unique opportunity to perform **occupational health surveillance** among workers in targeted industrial sectors known to have potentially harmful exposures in the workplace

Objective

Assessing the lung functions and to identify the prevalence of lung impairment of male non smoker , employees involved in three types of occupations (construction , food and petrol companies) in Karbala province during the year ,2013.

Subjects and Methods

This cross sectional study was conducted on a convenient (purposeful) samples of 296 male apparently healthy non smoker workers from three types of companies in Karbala province , **constructive** materials manufacturing companies(Cement, Thermos ton and ready made building), the second group workers from three **food** companies (soft drink, dairy and can food workers) the third group workers from **petrol** and gasoline gas products industry .



All participants were interviewed. The height and Weight were measured. The pulmonary functions were checked using the spirometry which was an electronic spirometer (portable Discovery -2 USA) The following information were entered to the spirometer : identification number , date of birth , gender , the smoking habit(all participant were nonsmokers or had quitting tobacco smoking for the last two years before the test) , height in centimeters and weight in kilograms.

ELECTRONIC SPIROMETER



DISCOVERY-2

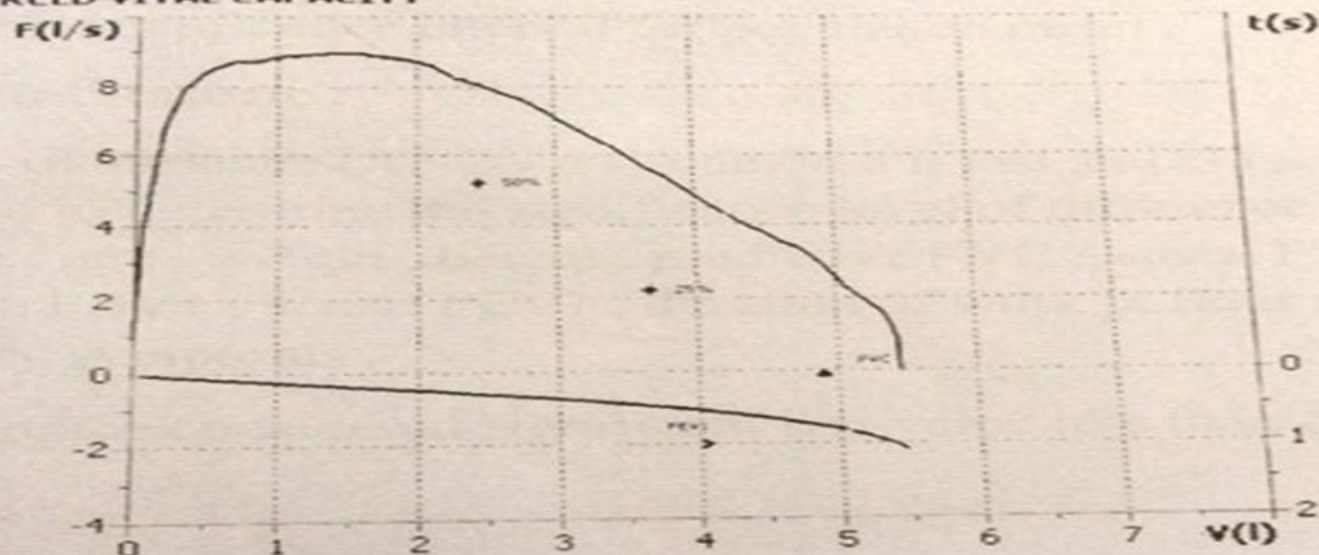
Last Name: D3
First Name:
Company:
ID:
User:
Height(cm):
Age:
Ethnic:

D3
172
28
N.Indian Pakist

Date (mm-dd-yyyy):
Gender:
Weight(Kg):
BMI(Kg/m²):

04/26/2011
Male
71
23.9

FORCED VITAL CAPACITY



Parameter	UM	Actual	Pred	%Pred
BestFVC	l	5.49	4.90	112
BestFEV1	l	5.40	4.11	131
BestPEF	l/s	9.03		
FVC	l	5.49	4.90	112
FEV1	l	5.40	4.11	131
PEF	l/s	9.03		
MEF75%	l/s	8.99		
MEF50%	l/s	7.65	5.20	147
MEF25%	l/s	4.58	2.20	208
FEF25-75%	l/s	7.05	4.42	159
FET100%	s	1.08		
FEV1/FVC%	%	98	83	118
LungAge	yrs	-13		

Predicted values: KNUDSON83


Diagnosis: Normal spirometry

Notes:



This test was done three times for each employee, and the highest value was taken

This maneuver is highly dependent on workers' cooperation and effort, and it's normally repeated to ensure the reproducibility, Forced expiratory Volume in 1 second (FEV₁) and Forced Vital Capacity (FVC) can only be under estimated, never over estimated.



The spirometer gives the results as printable graph, which includes the following values:

1. The expected [predictive] values which depend on the entered information of the subject.
2. The best [actual] one of three tests values which is based on performance of maximal inspiration and expiration of the subject.

The pulmonary function test parameters are:

The forced expiratory volume in one second (FEV₁), the forced expiratory volume in one second/forced vital capacity% (FEV₁/FVC %) and the

A method of categorizing the severity of lung function impairment based on the FEV1% predictive. (Normal >80%).

Degree of the severity

FEV1% predicted

Mild

≥ 70

Moderate

60-69

Moderately severe

50-59

Severe

35-49

Very severe

< 35

Severity of spirometric abnormality based on the forced expiratory volume in one second (FEV₁)

PFT was done in sitting position , with the use of nasal clip , the test repeated for three times .





RESULTS

Means and standard deviations of the baseline characteristics

	Mean	SD
Age (years)	37.88	13.1
Duration of employment	14 .6	14.7
Weight (kg)	75.91	9. 3
Height (Cm)	169.2	10.4
Body Mass Index	28.1	3.66

Tab. 1 Distribution of workers by age group

Age (years)	number	percentage
<30	71	(23.9)
31-40	119	(40.6)
41-50	76	(25.1)
51 - 60	24	(8.2)
> 60	6	(2.2)
Total	296	(100%)
Mean age(SD)	36,88 (13.1)	

2.Frequency distribution by duration of employments

Duration (year)	No	(%)
5- 10	71	(23.9)
11-15	84	(28.4)
16-20	99	(33.4)
20-25	36	(12.1)
> 25	6	(2.2)
Total	296	(100%
Mean duration	14.6	(4.7)

Distribution of workers by the severity of pulmonary impairments

occ.	Normal	mild	moderate	sever	obst	total
	n (%)	n (%)	n(%)	n(%)	n(%)	n(%)
Construction	11(15)	26(23.5)	41(37.2)	29 (26.5)	3(2.7)	110(100)
Food industry	30(25.9)	25(21.6)	36(31)	24(20.5)	1(1)	116(100)
Petrol industry	21(30)	27(38.6)	20(28.6)	2 (2.)0	0	70 (100)
Total	62 (20.9)	78(26.4)	97(32.6)	55(18.6)	4(1.5)	296 (100)

Chi square =13.7

P< P₀₅ (Significant difference)

FEV1 predictive and actual values of the study groups

Study groups	296N	Mean \pm SD predicted FEV ₁	Mean \pm SD actual FEV ₁	F-test	P-value
Food	110	4.13 \pm 0.31	2.22 \pm 0.81	20.235	<0.001*
Petrol	70	3.94 \pm 0.43	2.89 \pm 0.97		
Construction	116	4.08 \pm 0.40	2.14 \pm 0.96		

Fev1/fevc percentages of the study groups

industry	N	predicted	Actual	F test	Pvalue
food	116	0.82 ± 0.01	0.54 ± 0.19		
petrol	70	0.80 ± 0.02	0.67 ± 0.19	22.824	<0.001*
constriction	110	0.82 ± 0.01	0.49 ± 0.19		

Conclusions

This study showed that the means of FVC and FEV₁ in construction workers were significantly higher than those working in petrol and food industry workers ($p=0.008$ and $p < 0.0001$, respectively).

Industrial exposure adversely affects pulmonary function tests through decreasing both FEV₁ and FVC in asymptomatic workers which confirms the suggestion that respiratory function test sub normality may precede symptoms for many years..

Recommendations

- Industry workers should undergo periodic spirometer pulmonary function tests at rest and during exercise where indicated.
- In addition, there is a need to determine whether there has been environmental or occupational exposure of duration, intensity, and character sufficient to cause adverse effects.

Recommendations

- All workers especially in dusty occupations must undergo pre employment and periodic medical surveillance tests.
- Clinical assessments to fix workers to the proper job according to their health status .
- The compulsory use of personal protective devices such as (nasal mask) during working hours is essential .
- Improvement of environmental conditions of the work places with continuous monitoring by industrial hygienist .

Recommendations

- More comprehensive studies are requested to evaluate the health problems and its consequences in such occupations .
- Reactivation of the rules of occupational health department in Karbala directorate of social affairs to monitor the health of workers and improving their working conditions .
- Using mass media to increase the level of public awareness about occupational hazards , and emphasizing the use of personal protective devices .