

Considering the Respiratory Diseases Resulted from Harmful Chemical Factors among Workers in Factories with More than 50 Workers.

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Abstract: Introduction: life is impossible without respiration if we can't breathe, the life would stopped after a short time. Respiration means transportation of oxygen to cell and it's consumption in cellular level. This process is possible with the help of respiratory apparatus. The present study has been done in order to determine the respiratory capacities among workers for curing the respiratory apparatus and potential dangers which threaten this vital organ. Materials and methods: This study is analytical and the domain of its investigation is in the range of Ilam province factories with more than 50 personnel who are exposed to harmful chemical factors. all workers have done spearometry test and their demographical features were recorded in order to categorizing the workers in different classes, the proportions of (FEV1/FVC) and (FVC/PFVC) were calculated in relation to their respiratory capacity, by using the miller's standard table and divided according to various amounts of these two proportion in groups with normal respiratory statues, with limiting and obstructing discovers, limiting discovers and obstructive ones. Findings: An analysis was performed after data gathering and calculating the respective proportion by statistical methods and useful software. Research finding: considering the respiratory capacities based on miller's index showed that %43/1 of workers have normal respiratory capacities and the following relations were simultaneously (FVC/PFVC) *100 > 75 & (FEV1/FVC) *100 > 75. A group of workers who have proportional relation with (FVC/PFVC) *100 < 75 & (FEV1/FVC) *100 < 75 were placed in the group of workers with limiting and obstructive disorders and were %29/2 of the investigated society. And finally %27/2 has limiting disorder. No one observed with obstructive disorder. The relation between respiratory condition and worker's background was meaningful ($p = 0/039$, $df = 6$, $x^2 = 13/2$) Results: the results showed the effect of background on respiratory capacities. as in the group with less than 12 months labor, %46/7 have normal respiratory condition, %34/4 with limiting and obstructive condition and %18/9 with constricting respiratory condition. these percentage be longed to a group with constricting respiratory position, 13-24 months, %27/5 and more than 73 months, %35/5, i.e more increasing background, more increasing the percentage of afflicted people.

Key words: respiratory disorder, respiratory capacity, industrial factories.

INTRODUCTION

The work place is full of harmful factors which couldn't affect the health of persons by provisions to perform the preventive actions. Of these we could mentions ones which are inhaled and affected on respiratory apparatus and caused the incidence of diseases like respiratory apparatus ones. (Qolamnia, Reza *et al.*, 2004).

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Respiratory diseases are the results of direct contact with harmful chemical and biological factors and workplace physical dangers. It seems that these diseases have fewer incidences than others. But evidence showed that a large part of people, especially in developing countries, have been affected by respiratory diseases. In many cases the related diseases are serious and acute and the patient isn't able to any thing.

Dust, poison gases and vapor are factors which exist in most industries more or less and would cause the incidence of respiratory diseases and symptoms one of the diseases caused by mineral dust is pneumoninosis (Ali.Hefzolah., 1991).

Clinical and epidemiological studies proved the respiratory effects of dust (tobacco) and the researchers have done the in vitro studies on' the effects of the toxicology of this factor. (Qolamnia, Reza *et al.*, 2004)

Esmat Salehie and Samad Banisie have done a research about workers exposed to harmful chemical factors.

Their results showed that 0/77 of workers were healthy or at least the pulmonary illness symptoms haven't been observed about them. Of 0/23 workers afflicted with these diseases, %12/7 had background between 15-20 years, %7/8 with lo-ls years and %2/5 between 1-10 years. (Salehi. Esmat, 1997)

Aslanie *et al.*, study results showed that based on clinical symptoms, %20 of workers had cough background, %17asthma. In physical inspection %10 have voicing or wore dumb. the spirometric results %67 of workers were abnormal. The most prevalent abnormal spirometric finding was FVC reduction. Based on FEV1 and MMFR indices the %19 and %28 of workers had values lower than %80 respectively. (u)

The results of Deheshtie and Kermanie study showed that there was meaningful difference ($p < 0/05$) by comparing the mean values FEF%25 (FEF, FEF25 %75), PEF, VC, FVC, (FEV1/V3%) and (FEF%75), (FEF%50) and (PEFV %75-%85) among workers exposed to free silica dust and the control group were not exposed to this harmful factor. also, the mean values of obligatory respiration in first second, FEV1, and in the exposed group (FEV1/FVC%) showed meaningful reduction to control group . in the range of 35-39 years, the values of FEV1 and (FEV1/FVC)% have meaningful reduction in case group compared with control.

In the smokers group, there was meaningful reduction between the average of (FEV1/FVC) % and FEV1 in the case group compared with control.

The results of Azarie and Jahanie study showed that there was meaningful difference in the average of respiratory parameters of FVC, FEV1 and (FEV1/FVC) in both case and control. (Azarie. Mansoor, 2004)

Also, the results of the mentioned research showed that the correlation of FEV1 with background was meaningful but for FVC & (FEV1/FVC) regard to background was not meaningful.

The results of Qolamnia *et al.*, study showed that there is a meaningful difference between FEV1 and (FEV1/FVC) indices and normal values. This study has determined that by decrease and by increasing the worker experience FEV1 will decrease and by increasing age the value of FEV1 will be reduced but FVC increased.

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Based on the results of Bahramie *et al.*, study, it was determined that there was no meaningful difference between the values of FVC and FEV1 among tile, ceramic and stonework forces with less than lo years background compared to control. But the difference between FEV1 values of stonebreaking compared with control was meaningful in this study it was determined that the loss of amounts (FEV1, FVC and FEV1%) depends on the density of respiratory particles and background.

Browse *et al.*, reported that in female potters affected by cyclois, FEV1 has reduced 18 ml annually. But in patients with other diseases, this amount was 38 ml (Bahramie. Abdolrahman, 2004)

The results of Ahmad Alizadeh Larimie *et al.*, showed that in both case and control groups, there is meaningful difference in VC, FVC, FEV1, PEF and MRV amounts. This loss is obvious in persons with more background. (Kakooie. Hossein, 1998)

Method:

This study is cross - sectional which has been done on 120 workers of factories with more than 50 personnel or more during 1385-1386. These persons were exposed to harmful chemical factors.

The investigated community was included all workers occupied by factories with 50 workers or more. They were exposed to harmful chemical factors. They worked in respected factories during this plan.

Sample volume: with regard to this fact that Ilam province is among the ones that haven't developed industrial firms and the number of susceptible factories (with 50 workers or more) was very limited, hence all occupied workers have been investigated in the survey.

The method of sampling in this research was statistic and included all workers employed by legal factories. The tools for gathering data were including two parts:

First, a questionnaire was prepared with the idea of the professional health specialist and internal experts. This questionnaire was used to determine all useful factors to prevalence the respiratory diseases. The questionnaire related to workers was completed after proving it's validity.

In second stage, the spirometry test has been done for all mentioned workers and pulmonary volumes were determined and recorded, including: current volume, breath reserve volume, re-breath reserve volume, remained volume and respiratory capacities including breath capacity with vital one, total remained capacity and total lung capacity of every worker was determined and recorded by spirometer. In the final stage, worker's respiratory problems were diagnosed and analysed based on spirometry test and under the supervision of professional physician. The related results have been recorded in special forms.

Data Analysis Method:

After recording the demographical characteristics and spirometry test results based on the values in miller's table, the personal status was determined in normal position, by having limiting discover or obstructive one. If $(FEV1/FVC)*100 > 75$ and $(FVC/PFVC)*100 > 75$, then the person has normal position, if $(FEV1/FVC)*100 < 75$ and $(FVC/PFVC)*100 > 75$, and obstructive disorders and affected by asthma or emphysema if $(FEV1/FVC)*100 > 75$ and $(FVC/PFVC)*100 < 75$, a person has pulmonary fibrosis. If $(FEV1/FVC)*100 < 75$ and $(FVC/PFVC)*100 < 75$, a person has obstructive disorder, i.e. there is respiratory apparatus problem without symptom.

After classification of data, the absolute and relative frequency and other central indices and distribution were used to determine the relation between qualitative data of χ^2 test, quantitative data of T test and variance analysis, in regard to the correlation of groups, we have used Spearson, Spearson and Condal correlation tests. All statistical functions and analyses the data have been performed based on SPSS software.

Findings:

The results showed that %99/5 of workers were male and %5 female, %49/7 with primary education, %50/3 secondary, %3/5 graduate or postgraduate and %6 were non-literate, %75/8 were married, %24/2 batch lore. the average of age, length, weight and background were $(33/24 \pm 8/94)$ years, $(175/39 \pm 6/71)$ cm, (70 ± 9) kg and $(61/76 \pm 45/88)$ month) respectively.

The results showed that %12/3 of workers smoke at present and 13/4 previously, 0/3 with respiratory diseases, %8 with pulmonary disease, %2/7 with other illnesses, %4/8 were hospitalized, %16/5 were exposed to unbalanced heat, %19/7 in abnormal light position, %21/1 with unbalanced vibration, %31/1 exposed to aerosols and dust, %8/4 motivating and inflammatory materials, %3/5 neutral dust and others exposed to causes like poison, smoke, vapor and gas, ionized rays and soon. %29 of worker have $(FVC/PFVC) > 75$, %41/6 with $(FEV1/FVC) > 75$ and %33/4 with $(FVC/VC) > 75$. %43/1 of workers has normal respiratory capacity, %29/2 with limiting and obstructive discovers, %27/7 with limiting disorder and a person only with obstructive disorder was not found. (Table1).

In 25-75 months group, %30/9 workers have limiting and obstructive condition, %27/5 with limiting condition and it was not observed a person with obstructive position in this work background range. χ^2 test showed a meaningful relation between respiratory condition of workers and their background. ($p = 0/39$, $df = 6$ and $\chi^2 = 13/2$).

These findings have shown no meaningful relation between respiratory condition of workers with the level of their education, marital status, height, weight, sex and age. χ^2 test showed that there is not a meaningful relation between respiratory conditions based on age groups.

In the range of (14-24 years), %40/7 of workers have normal status, %42/4 with limiting and obstructive condition and %16/9 with limiting condition.

The least normal respiratory condition has been found in group with 54 years or more age. In this age group, %30/4 had limiting and obstructive respiratory condition and %34/8 limiting condition. There was no meaningful relation between respiratory condition based on age and height of various groups. Statistically, there wasn't meaningful relation between weight and respiratory condition indifferent groups. (Table3).

Discussion and Conclusion:

Respiratory capacities and proportions have been used as indices to determine the normal capacities and related disorders. The normal amount of FVC factor was variable in the range of 3-7 litre based on sex, age and height. by increasing age and changing the lung structure, this capacity reduced, hence, when the normal limit of FVC was considered %100, in %95 of cases, the standard deviation (100± 20) was normal and the range of (%80 - %120) was accepted as normal.

It is obvious this issue is considerable when the percentage hasn't been reduced after 6 months by repeating the experiment. In this case, it is judged that a person is healthy with regard to pulmonary capacity. In the other case he is regarded as patient.

Table 1: Frequency distribution of workers according to respiratory condition proportion in Ilam province factories with more than 50 workers.

Respiratory condition	Frequency	%
Normal	267	43/1
With limiting and destructive disorder	181	29/2
With limiting disorder	172	27/7
destructive disorder	0	0
total	620	100

Table 2: Frequency distribution of workers according to the respiratory condition and background in Ilam province factories with more than 50 workers.

Background(month)	Respiratory condition					total		
	Normal		Limiting and obstructive		limiting		frequency	%
	frequency	%	frequency	%	frequency	%		
<12	46/7	31	34/4	17	18/9	90	100	
13 – 24	36/8	9	47/4	3	15/8	19	100	
25 – 72	41/6	99	30/9	88	27/5	320	100	
>73	44/5	42	22	64	35/5	191	100	
	X2 = 13/2	Odf = 6	p= 0/39< /0/05					

Table 3: Frequency distribution of workers based on respiratory condition and marital status in Ilam factories with more than 50 workers.

Marital status	Respiratory condition						total	
	normal		Limiting and obstructive		limiting		frequency	%
	frequency	%	Frequency	%	frequency	%		
Married	200	42.6	136	28.9	134	28.5	470	100
Single (batch lore)	67	44.7	45	30	38	25.3	150	100
Total	267	43.1	181	29.2	172	27.7	620	100

Table 4: Frequency distribution of workers based on respiratory condition and marital status in Ilam factories with more than 50 workers.

Variables	Normal	frequency	%	Limiting and obstructive		limiting	
				frequency	%	frequency	%
Age	14-24	24	40.7	25	42.4	10	16.9
	24-34	165	43.7	105	27.8	108	28.6
	24-44	44	41.9	31	29.5	30	28.6
	44-54	26	47.3	13	23.6	16	29.1
Sex	>54	8	34.8	7	30.4	8	34.8
	Man	264	42.8	181	29.3	172	27.7
Length	Woman	3	100	-	-	-	-
	<145	1	50	-	-	-	-
	145-164	19	58.4	7	18.9	11	29.7
	165-180	208	43.3	148	30.8	124	25.8
Weight	>180	39	38.6	36	25.7	36	35.6
	<60	9	37.5	8	33.3	7	29.2
	60-64	73	44.5	48	29.3	43	26.2
	65-70	84	50.6	43	25.9	39	23.5
	71-74	22	36.7	20	33.3	18	30
	75-80	50	41.7	34	28.3	36	30
	81-84	12	37.5	11	34.4	9	28.1
85-90	11	31.4	10	28.6	14	40	
>91	6	31.1	7	36.8	6	31.1	

Table 5: Frequency distribution of workers based on respiratory condition and marital status in Ilam factories with more than 50 workers.

Variables	Respiratory status	Normal		Limiting and obstructive		Limiting	
		Frequency	%	frequency	%	frequency	%
background	<12	42	46.7	31	34.4	17	18.5
	13-24	7	36.8	9	47.4	3	15.8
	25-72	133	41.6	99	30.9	88	27.5
	>72	85	44.5	42	22	64	35.5
Literacy	unread	14	37.8	11	29.7	12	32.5
		136	-	101	-	92	-
		117	-	69	-	68	-
Marital status	Married	200	42.6	136	28.9	134	28.5
	Single (batch lore)	67	44.7	45	30	38	25.3

Table 6: Frequency distribution of workers based on respiratory condition and marital status in Ilam factories with more than 50 workers.

Respiratory capacity	FVC/PFVC		FEV1/FVC		FVC/VC	
	frequency	%	Frequency	%	frequency	%
>75%	180	29	258	41.6	207	33.4
<75%	440	71	362	58.4	413	66.4

With regard to related capacities, the main index of respiratory apparatus health is (FEV1/FVC) *100 and the experiment showed that if this number is more than %70, the person is healthy, but lower than that it, patient. Based on results, it was determined that %58/4 of investigated persons had (FEV1/FVC) < 70 how were regarded as patient. In relation to classifying the respiratory condition, the existence of %29/2 with limiting-obstructive disorders, %27/7 with limiting disorders was considerable and determined the high frequency of respiratory disorders among workers.

The highest frequency of worker numbers was in the range of 24-34 years and regardless of confirming %27/8 limiting and obstructive disorders an %28/6 limiting disorders, there wasn't a meaningful relation between respiratory condition in different age groups. But highest percent was %42/4 in the range of 14-24 years and %30/4 in more than 54 years. For limiting and obstructive disorders, the highest percent of limiting disorders was in the range of 44-54 years with %27/1 and > 50 years with %34/8. it means that although there has not been found a meaningful relation in performed tests statistically, age is a native effective factor on the incidence of respiratory disorders in limiting & limiting-obstructive categories the results of Dehdashtie *et al.*, categories have confirmed the relation between age and respiratory capacities. (Dehdashtie. Alireza, 2004) %100 women in this study had normal respiratory condition it's because of very small amount of female population industrial activities. Among male population activated in industrial groups, %42/8 had normal condition, %29/3 limiting and obstructive and %27/7 with limiting disorders. X2 test didn't show any meaningful relation between sexes an respiratory condition of workers. Results of Prowse *et al.*, showed the meaningful relation between respiratory condition of worker and age against women, this is opposite the results of this research. (Bahramie.Abdolrahman, 2004) The results of present research confirmed this issue that there is a meaningful relation between respiratory condition and background. [X2=2, df=6, p=0/039]. The results of Ahmad Alizadeh *et al.*, research showed that there is meaningful relation (Kakooie.Hosseini, 1998) but Abdolrahman Bahramie *et al.*, results didn't show any meaningful relation. (Bahramie.Abdolrahman, 2004) %43 of nonsmokers have normal respiratory capacity and %27/4 have disorders. Statistically, there was no meaningful relation between respiratory condition of workers and smoking.

But the results of Dehdashtie *et al.*, research showed that there is meaningful relation between them. (Dehdashtie. Alireza, 2004).

Based on findings, the most prevalent respiratory disorder was among workers with multiple disorders who included %29/2. Limiting disorder is in the second stage with %27/7. background is one optimal factor for workers with respiratory disorders risk factors like smoking, respiratory disease history, pulmonary disease, contact with harmful physical factors in workplace, contact with aerosols, dust, using the individual protective devices and mask had been effective in relation to change in respiratory capacities and incidence of respiratory disorders and are a suitable case to do other research.

Recommendations:

Performing precise periodical and pre-employment experiments ,considering the results by physicians and labor medicians, paying attention to efficiency of local air conditioner, replacing worn-out machineries with modern ones, motivating workers to use individual protective devices which are suitable for and reduce dusts and fibres like lead, asbestos, fumes, mists, radioactivated and biological materials (Moodie, 2002).

Attention to respiratory symptoms of workers such as cough, chest constriction, asthma, health education to deserve the health principles is very necessary and must be regarded by industrial managers and employers.

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