The Study of Pulmonary Function Tests in Chronic Alcoholics

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Research Article

Abstract: **Background and objective:** The present study was undertaken to assess the pulmonary function tests in chronic alcoholics. Alcohol has multitude of effects on many organ systems producing distinct clinical entities, particularly in lung, heart, liver and central nervous system. **Material and Methods:** The study was done using computerized medspiror. It includes 50 male chronic alcoholics of 20 - 60 years age and 50 normal male healthy subjects who served as age matched controls. The following lung function viz FVC, FEV1/FVC ratio, PEFR was carried out and subjected for statistical significance. Analysis was carried out by 't' unpaired test**. Result:** The results of the study revealed statistically significant ($P<0.05$) decline in FVC and FEV1/FVC ratio, PEFR in chronic alcoholics as compared to normal control group, suggesting chronic alcoholism definitely affects pulmonary functions with the manifestations of both obstructive as well as restrictive pattern. **Conclusion:** Thus we conclude that alcoholism adversely affects pulmonary functions. (1).

Keywords: Chronic alcoholics FVC, FEV1/FVC ratio, PEFR, PFT.

1. Introduction

It has been seen that significant proportion of male population are regular consumers of alcohol. In recent years, it has became increasingly evident that alcohol has multitude of effects on many organ systems producing distinct clinical entities, particularly in lung, heart, liver and central nervous system (1,2). Alcohol is deleterious to the lung; prolonged excessive alcohol intake can cause structural changes in lungs. Incidence of lung disease is higher in chronic alcoholics and they are prone to upper respiratory tract infection, repeated aspirations. Thus prolonged alcohol abuse affect the ventilator function of lung primarily by causing airway obstruction and diffusion limitations (3). There are studies, which documented significant inverse co-relation between the degree of airway obstruction and alcohol consumption in both young male and female but not in other age groups (4). Alcohol consumption was directly co-related to annual decrease in FEV1 and FVC($P<0.05$) (5). In chronic alcoholics, the concentration of alcohol that reaches the lung may be considerable which in turn might have produces cellular injury either by direct toxicity or by interference with metabolic process. The present study was aimed at to measure the lung function in order to assess the airway obstruction or restriction.

2. Material and Methods

The present study entitled "The study of pulmonary function tests in chronic alcoholics" has been carried out at M.R Medical College, Gulbarga, after taking ethical clearance. Total of 100 male subjects belonging to age group of 20 - 60 year, of 50 were chronic alcoholics and 50 were normal healthy subjects, who served as age matched controls. All the subjects included in the study were moderately nourished non smokers and their liver function tests were normal. The chronic alcoholics who consumed country liquor of more than 700ml per day for at least 5years continuously were only considered. Pulmonary function tests were carried out with the instrument "Computerised Medspiror" manufactured by (Recorders and Medicare systems Chandigarh) which is high performance pneumotachometer capable of giving accurate test results and excellent reproducibility. The co-operation from the subjects being an important factor, all the subjects were explained in detail the procedure of lung function tests along with demonstration prior to the recordings. An informed consent is taken from the subjects. In the beginning, the following data was fed to the instrument.

- Age in years
- Sex
- Room temp in ^{0}C
- Standing height in cm.
- Weight in kg.

The subject was asked to perform forceful expiration after forceful inspiration, three reading were taken and best one was taken for analysis, for each subject predicted and observed values of all respiratory function parameter were obtained, but in the present study we have only considered observed values for calculations. For every subject new disposable mouthpiece was used. All the values of respiratory function tests parameters were automatically converted to BTPS by the instrument itself.

Statistical analysis: Analysis was carried out by 't' unpaired test.

3. Results

All the results and calculations were carefully subjected to standard statistical tests for statistical significance. The result of observed values of FVC, FEV1/ FVC% ,PEFR in control and chronic alcoholics are shown in tables I, II and III.

Table 1: Observed values of FVC in liters in control and chronic alcoholics patients (ALC)

Age group	**21-30yrs**		**31-40yrs**		**41-50yrs**		**51- 60yrs**	
	Control	**ALC**	**Control**	**ALC**	**Control**	**ALC**	**Control**	**ALC**
n	13	10	18	19	15	16	13	14
Mean	2.78	1.75	2.81	1.98	2.74	1.83	2.73	1.97
S.D	0.22	0.44	0.14	0.23	0.17	0.54	0.18	0.37
't'	P<0.005		P<0.005		P<0.005		P<0.005	

The result showed a significant decrease in FVC in chronic alcoholics as compared to control group.

Table 2: Observed values of ratio of FEV1/ FVC % in control and chronic alcoholic patients (ALC)

Age group	21-30yrs		31-40yrs		41-50yrs		51- 60yrs	
	Control	ALC	Control	ALC	Control	ALC	Control	ALC
n	13	10	18	19	15	16	13	14
Mean	98.30	97.56	99.72	97.36	99.60	97.20	99.80	94.00
S.D	3.03	4	0.80	8.97	1.12	4	1.01	7.8
't'	P>0.005		P>0.005		P<0.005		P<0.005	

FEV1/FVC% showed a decrease, but the decrease was statistically significant in the age group 41-50yrs and 51-60yrs

Table 3: observed values of PEFR liters /sec in control and chronic alcoholic patients (ALC)

Age group	21-30yrs		31-40yrs		41-50yrs		51- 60yrs	
	Control	ALC	Control	ALC	Control	ALC	Control	ALC
n	13	10	18	19	15	16	13	14
Mean	10.37	6.67	10.26	7.22	10.28	4.86	9.1	4.84
S.D	0.58	1.78	0.58	1.81	0.39	2.08	1.83	2.05
't'	P<0.005		P<0.005		P<0.005		P<0.005	

The PEFR value were decreased and found to be significant statistically in all the age group when compared with the control

4. Discussion

The careful analysis of observation and results in the present study revealed significant decline in observed values of FVC and FEV1/FVC ratio, PEFR. A similar decline in FVC and FEV1 has been reported the loss of FEV1 and FVC greater in alcoholics who consumed more or less 350gm of alcohol pre week. There was also reduction in the FEV1/FVC ratio in 50% of alcoholics (5,7). Bernice H. Cohen, found that there was significant decrease in FEV1/FVC ratio in heavy drinkers (8). In our study the ratio of FEV1/FVC showed a decline which was statistically significant only in chronic alcoholic belonging to age groups 41-50 yrs and 51-60yrs probably the subject belongs to that group may not be chronic alcoholic as compared to the old age group. These finding suggest that chronic alcoholism may affect pulmonary functions leading to obstructive diseases. In the lungs, cilia and the overlying mucous layer are essential components of the defense mechanism (9,10). In experimental animal, alcohol will limit the transport of carbon particles trapped in mucous layer overlaying the cilia (11). The ciliary motion is affected by chemical factors and it is demonstrable only at high blood alcohol concentrations. The alveolar macrophages are intimately concerned with cleansing of the tracheo-bronchial tree and the defense against pathogens. Alcohol slows the migration of these phagocytic cells. The bactericidal capacity of these cells, which is normally accentuated, is depressed by exposure to alcohol. (12,13). The excessive consumption of alcohol limits the renewal of dipalmitylphosphatidyl choline. The surface active phospholipids in the alveolar lining layers, is essential to stabilize surface tension at various lung volumes.(14,16,18) Chronic alcoholism by impairing the protective mechanism of the lung and altering the surface tension of air tissue interface, may be responsible for irreversible structural changes in the lung parenchyma.(18-21). Alcohol elevates blood acetaldehyde levels, which leads to deregulation of mast cell (basophiles) resulting in release of a chemical mediator such as histamine, which induces asthma.(22) It is interesting to note that PEFR showed a decrease, which was statistically significant. As we could not come across pertinent references in this regard, it is difficult to provide adequate explanation prompting further studies in this regard.

5.Summary and Conclusion

To conclude, the various factors as explained above affect airways and lung parenchyma resulting in the decline of pulmonary function especially FVC, FEV1/FVC ratio and PEFR. The chronic alcoholism leads to both restrictive and obstructive airways diseases.

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