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Study Of Spirometric Evaluation In Type 2 Diabetes Mellitus

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ABSTRACT
Diabetes affects many organs of the body,present with microvascular pathologies. lungs of diabetic shows thickening of alveolar epithelial and pulmonary capillary basal lamina leading to reduced pulmonary elastic recoil and lung volume. Pulmonary function tests are employed to access the functional capacity of lungs. Present study showsspirometric changes in patients with diabetes mellitus. Effect ofdiabetes mellitus on spirometric values explored a reduction in FVC, FEV1. There was a restrictive pattern of Pulmonary abnormality though patients were asymptomatic. There was a correlation between reduced Pulmonary function values , duration of diabetes mellitus , glycemic control.Reduction in lung diffusion capacity is common in diabetic patients with signs of microangiopathy.

Keywords:Diabetes mellitus, forced vital capacity, Spirometry

I. INTRODUCTION

There are 150 million diabetics worldwide. India has more than 3 crores of persons with DM or one-fifth of the global burden earning ignominy diabetic capital [1]

The incidence of Type 2 diabetes has been steadily increasing in urban areas to 8.4% [2]. Diabetes mellitus common metabolic disorders that share the phenotype of hyperglycemia.include reduced insulin secretion, increased insulin resistance, decreased glucose utilization, and increased glucose production [3].

This metabolic disorder precipitating micro vascular pathologiesleading to autonomic,peripheralneuropathy, nephropathy, retinopathy , macrovascular pathologies leading to coronary artery disease,cerebrovascular accidents and peripheral vascular disease. The micro vascularcomplications appear early, within 5 to 10 years and macro vascular complicationsappear within 15 to 20yrs from the onset of diabetes [4].

Histopathological changes in lungs of diabetics showsthickened alveolar epithelial and pulmonary capillary basal lamina leading to reducedpulmonary elastic recoil and lung volume. There is impaired diffusion due to reducedpulmonary capillary blood volume and thickening of the basement membrane. Nonenzymatic glycosylation induced alteration of lung connective tissue is the most likelymechanism underlying the mechanical pulmonary dysfunction in diabetic subjects.This suggests that lung is also a target organ [5].Spirometry is a widely used pulmonary

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function test (PFT), ideally suited to describing the effects of obstruction or restriction of lung function.

II. MATERIALS AND METHODS

Sample Size

64 patients with Type 2 Diabetes mellitus attending Medicine OPD and patients admitted in MMCH & RI who fulfill inclusion exclusion criteria .

Sampling Method and design

Simple random sampling; Exploratory and descriptive study

Inclusion criteria

Type 2 Diabetes mellitus persons in age 30 – 80 years, Male and female are included, patients give written informed consent.

Exclusion Criteria

COPD, Bronchial Asthma, Pulmonary Tuberculosis, Smokers

Complete Hemogram ,FBS,PPBS,HbA1c ,Urine Routine ,Renal function test,ECG,ChestX-Ray ,Pulmonary function measured by spirometry.Diabetic patients were selected as per the criteria .CONSENT Obtained. history, Age, height, weight, body mass index were recorded. 6 hrs of fasting, the blood samples [3ml volume] was drawn for FBS and glycated hemoglobin.subjects were made to undergo pulmonary function test using the KOKO LEGEND 2 computerized Spirometer, for three times at every 15 minutes interval. The FVC, FEV1, FEV1/FVC were recorded. best of the three was taken into account.After 2 hrs of breakfastblood sample was drawn for PPBS..

Statistical Analysis

The statistical analysis according to SPSS- Version 21, Tabulation and charts as per variables considered.

III. RESULTS

Results of the study was graphically represented (Figure 1 and 2)

Figure 1. FVC% with Duration of Diabetes mellitus

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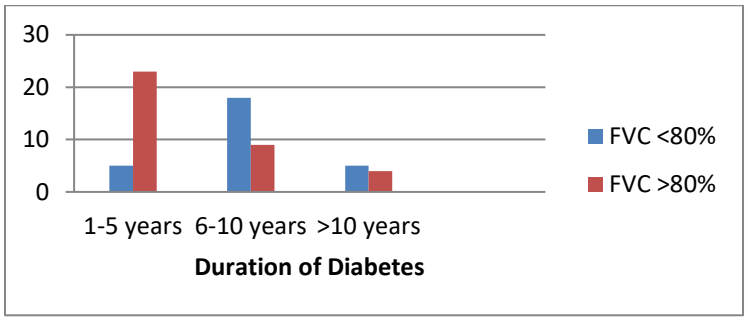

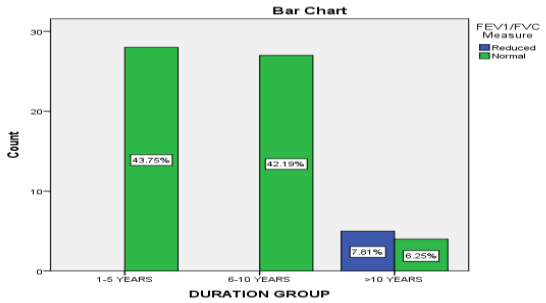

Figure 2. FEV1/FVC% duration of Diabetes Mellitus

As the duration of diabetes increases there is increasing trend in number patients with reduced FVC%,reduced FEV1/FVC% . Hence there is correlation between duration of diabetes and FVC% , FEV1/FVC%. Also as the P-value is <0.05 it is statistically significant

IV. DISCUSSION

This study includes 64 patients with type 2 diabetes mellitus, out of which there is a large number of female subjects 37(57.8%) compared to males 27(42.2%). The probable cause for this female preponderance were non-smokers, many males were excluded for smoking history. When duration of diseases was compared with all parameters the following was observed as there was a tendency of all parameters to fall with longer duration of diabetes and Poor glycemic control was associated with reducing pulmonary functions.Absolute values and percentage of predicted normal values of FEV1, MVV, vital capacity and total lung capacity were reduced in NIDDM group [10].

The diabetic subjects had slightly smaller height adjusted FEV1&FVC compare values of non-diabetic subjects, their regression analysis also, showed association between raised values of plasma glucose and reduction of the lung function was highly significant [9].

Earlier findings reported finding abnormal pulmonary function tests in their diabetic patients that were mild and unlikely to be of clinical significance. The most likely explanation is that single breath method may not be sensitive enough to detect pulmonary vascular microangiopathy [11]. Low pulmonary vascular pressures determine only minor changes in pulmonary capillaries of diabetes mellitus subjects, and so the commonly used method of DLco might not discriminate between diabetics mellitus and normal subjects. They concluded that doing a longitudinal study may help to identify a temporal pattern of lung involvement and relation to other organ involvement. In our study, we did not look at diffusing capacity.Diabetes mellitus is a metabolic disease characterized by absolute or relative insulin deficiency [12]. Diabetes mellitus may involve the lung apart from kidneys, eyes and nerves since the pulmonary microvascular circulation is extensive and has abundant connective tissue[7]. Renal and retinal manifestations of diabetic microangiopathy have frequently been studied [13-18] and there are also several studies on diabetic microangiopathy in other organ systems [19-21]. Some reported normal pulmonary function, others found abnormalities in lung volumes, pulmonary mechanics, and diffusing capacity [19].

Many authors described a thickening of alveolar epithelial and pulmonary capillary basal lamina in human subjects with IDDM; others found ultrastructural changes in pneumocytes, bronchiolar epithelium and connective tissue proteins in rats with streptozotocin-induced diabetes[20]. The first pathophysiologic change in microangiopathic complications is thickening of the basement membrane.Alveolar capillary membrane begins to thicken with longer diabetes duration, and this reflects itself both on ventilation functions and ventilation perfusion parameters[21].Earlier study showed a decrease in mean FVC values as the duration of DM increased. In their study the annual rate of fall in FVC was 68 ml [6] and there was a progressive decrease in mean FVC values by 109 ml/year [22].Alsothere was an average decrease of 9.5% in mean FVC Values in diabetics [23] and there was a progressive increase in mean FVC values in diabetic patients.In our study there is decrease in pulmonary functions as duration of diabetes increases [24].The effect on the FVC was even more pronounced in diabetics who had duration of disease longer than 5 years, and the effect was not explained by the difference in age alone. Subjects with poorer diabetic control have worse spirometric function.

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