EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 4
Issue: 5
507-509
Year: 2017

DEVELOPMENT OF RESTRICTIVE LUNG DISEASES IN DIABETIC PATIENTS

Harsh Chapadia[1], Rassam Khan[2], Milan Gajera[3], Tapan Miyani[4], Milisha Lal[5], Rumana Tokaria[6], Pranav Patel[7] and Abhishek Vadher*[8]

[1]Physician, Chapadia Medical Center.
[2]Research Scholar, Rutgers University.
[3]Medical Graduate, Medical College Baroda.
[4]Medical Graduate, Dr DY Patil Medical College, Pune.
[5]Physician, Bharati Vidyapeeth Hospital.
[6]Clinical Research Associate, Tampa General Hospital.
[7]Medical Graduate, Medical College Baroda.
[8]Medical Officer, Shreeji Hospital.

***Corresponding Author: Dr. Abhishek Vadher**
Medical Officer, Shreeji Hospital.

Article Received on 20/03/2017 **Article Revised on 11/04/2017** **Article Accepted on 01/05/2017**

ABSTRACT

Introduction: Diabetes is a disease which affects many systems. The effects of Diabetes on lungs in poorly understood. Different studies show different results. Hence, in this study, we tried to find the effects of long standing diabetes on lungs by checking pulmonary function test. **Materials and Methods:** In this study, we took 40 diabetics and 40 control patients. Diabetics with age between 40 and 60, >10 year of diabetes history and with proper sugar controls were taken. Patients with any renal, liver or metabolic complications were excluded. FEV1, FVC and FEV1/FVC were measured using spirometry. **Results:** FVC in the diabetes group was 91.45±8.67 and in the control group was 74.86±14.95. P value was <0.01 and hence the finding was significant. FEV1 was 89.48±7.45 in the diabetes group and in the control group was 77.46±12.87. P value was <0.01 and hence the difference was significant. FEV1/FVC was 109.45±8.67 and in the diabetes was 111.54±9.85 in the control group. The p value here was >0.05 and hence the finding was not significant. **Conclusion:** In patients with diabetes, FEV1 and FVC are reduced. FEV1/FVC ratio was not significantly different from the controls. Hence, diabetes can possibly lead to restrictive lung disease in long term.

KEYWORDS: Diabetes is a disease which disease in long term.

INTRODUCTION

The worldwide prevalence of diabetes is high. WHO estimates that 180 million people have diabetes.[1] Diabetes Mellitus can lead to macrovascular and microvacular disorders. The macrovascular complications of diabetes are stroke, myocardial infarction and peripheral arterial disease. The microvacular complications of diabetes are diabetic retinopathy, renal disease and diabetic neuropathy.[2] The macrovascular complications of diabetes are ischemic heart disease, stroke and peripheral vascular disease.[2]

Diabetic retinopathy is the leading cause of visual disability in people with diabetes.[3] It can affect macula and peripheral retina. Diabetes mellitus first results in a non-proliferative retinopathy and then as the disease progresses, it causes abnormal growth of blood vessels and proliferative retinopathy. [4] Studies have showed that after 30 years of duration of diabetes, almost all patients had some form of diabetic retinopathy. This is applicable to both type 1 and type 2 diabetes. Diabetic retinopathy can cause partial or total vision loss due to retinal detachment or vitreous hemorrhage. Studies show that about one half of people with diabetes will develop monodiabetic or polydiabetic neuropathy.[5] Lower extremity loss of sensation is the most common neuropathy and this can commonly lead to foot ulceration.[6] The first manifestation of diabetic nephropathy is microalbuminuria and this can lead to overt albuminuria and eventually renal failure and end stage renal disease.[7]

The most common macrovascular complication of diabetes mellitus is myocardial infarction. Patients with diabetes mellitus are 4 times more likely to have an episode of myocardial infarction when compared to patients without diabetes mellitus.[8] With diabetes, the risk of stroke increases to 2-4 times. Also, in patients with diabetes, stroke is associated with severe

neurological deficits and disability and a poor long term prognosis.[9]

The pulmonary complications of diabetes are poorly understood. Different studies have showed different results. The duration of diabetes and glycemic control also plays an important role in the effect of pulmonary functions. In this study, we tried to compare FEV1 and FVC in diabetic patients with non-diabetic patients.

MATERIALS AND METHODS

Diabetes mellitus can have variety of complications depending on the level of glycemic control, duration of diabetes and other co-existing conditions. Hence, in our research, to keep the study unbiased we used some specific inclusion criteria. Patients with age between 40 and 60 were taken. The duration of diabetes was >10 years and all the participants had a proper glycemic control. All participants with any renal, liver or metabolic disease were excluded from the study. We took 40 diabetic participants. 40 controls with adjusted age, sex and other co-existing conditions were taken. FEV1 and FVC was measured with the help of lung spirometry and then noted. A student chi square test was done to compare the outcomes of the two groups. P value was set to be <0.05 for statistical significance.

RESULTS

FVC in the control group was 91.45±8.67 and in the diabetes group was 74.86±14.95. P value was <0.01 and hence the finding was significant. FEV1 was 89.48±7.45 in the diabetes group and in the control group was 77.46±12.87. P value was <0.01 and hence the difference was significant. FEV1/FVC was 109.45±8.67 and in the diabetes was 111.54±9.85 in the control group. The p value here was >0.05 and hence the finding was not significant.

DISCUSSION

In our study, we found out that FVC and FEV1 were lower in diabetic patients when compared to control group. There was no difference between the two groups in FEV1/FVC ratio. These findings suggest restrictive type lung disease. Van den Borst et al did a meta analysis and this showed that diabetes mellitus is associated with restrictive type of lung disease.[10]

A study by David et al showed that VC, FVC, FEV1 and PEFR decreased at an average of between 1.1% and 3.1% of predicted values/ year in type 2 Diabetes Mellitus patients.[11]

The exact pathophysiology behind the restrictive lung disease pattern is still not known exactly. The normal gas exchange in the lungs is influenced by pulmonary microvasculature and pulmonary connective tissue intergrity. In diabetic patients, there are histopathological changes in the lung tissue. The study by Weynand et al showed that in patients with diabetes, there was thickening of alveolar epithelium, endothelium capillary and basal laminaes.[12] These findings were observed in an electron microscope. The reduction in PFTs is due to acceleration of aging process in connective tissues cross links and nonenzymatic glycosylation and alveolar surfactant action modification. Some studies also showed that the thickening of basal laminae was of the same magnitude in lungs as it was in lungs and kidneys. Moreover, microangiopathy was found in the study which showed reduction in pulmonary capillary blood volume this in turn leads to redistribution of the pulmonary circulation. Now, the well ventilated areas of the lung becomes underperfused.[13]

Thorax and lungs are rich in collagen and elastin and the nonenzymatic glycosylation of these substances results in the stiffening of thorax and lung parenchyma, thus developing a restrictive lung disease. Diabetic polyneuropathy can also affect neuromuscular functions of lungs and this can lead to reducing the pulmonary volumes.[14]

There are also some studies which have showed that there is no co-relation between PFTs and diabetes mellitus.[15] Diabetes is a disease of multiple organs and hence further research must be conducted in this field to find the exact co-relation between the developments of lung disease in the diabetic patients. Our study was limited as we had a limited number of patients. Further studies should be done with a more number of patients.

CONCLUSION

In patients with diabetes, FEV1 and FVC are reduced. FEV1/FVC ratio was not significantly different from the controls. Hence, diabetes can possibly lead to restrictive lung disease in long term.

REFERENCES

1. World Health Organization. Fact sheet: Diabetes No 312, November 2008. [Last accessed on 2009 Apr 14]. Available from: http://www.who.int/mediacentre/factsheets/fs312/en/index.html . [Ref list].
2. Phys Ther. 2008 Nov; 88(11): 1322–1335. Diabetes-Related Microvascular and Macrovascular Diseases in the Physical Therapy Setting.
3. World Health Organization. Diabetes facts. Available at: http://www.who.int/mediacentre/factsheets/fs312/en/index.html. Accessed December 13, 2007. [Ref list].
4. Harding S. Extracts from "concise clinical evidence": diabetic retinopathy. BMJ. 2003; 326: 1023–1025.
5. Dyck PJ, Kratz KM, Karnes JL, et al. The prevalence by staged severity of various types of diabetic neuropathy, retinopathy, and nephropathy in a population-based cohort: the Rochester Diabetic Neuropathy Study. Neurology. 1993; 43: 817–824.
6. Boulton AJ. Foot problems in patients with diabetes mellitus. In: Pickup J, Williams G, ed. Textbook of

Diabetes. London, United Kingdom: Blackwell Science; 1997: 1–58.
7. Brenner BM, Cooper ME, de Zeeuw D, et al. Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. N Engl J Med. 2001; 345: 861–869.
8. Buyken AE, von Eckardstein A, Schulte H, et al. Type 2 diabetes mellitus and risk of coronary heart disease: results of the 10-year follow-up of the PROCAM Study. Eur J Cardiovasc Prev Rehabil. 2007; 14: 230–236.
9. Sprafka JM, Virnig BA, Shahar E, McGovern PG. Trends in diabetes prevalence among stroke patients and the effect of diabetes on stroke survival: the Minnesota Heart Survey. Diabet Med. 1994; 11: 678–684.
10. Borst BB, Gosker HR, Zeegers MP, Schols AM. Pulmonary function in Diabetes: A Metaanalysis. Chest. 2010; 138: 393–406.
11. Davis WA, Knuiman M, Kendall P, Grange V, Davis TM. Glycemic exposure is associated with reduced pulmonary function in type 2 diabetes, the fremantle diabetes study. Diabetes Care. 2004; 27: 752–7.
12. Davis WA, Knuiman M, Kendall P, Grange V, Davis TM. Glycemic exposure is associated with reduced pulmonary function in type 2 diabetes, the fremantle diabetes study. Diabetes Care. 2004; 27: 752–7.
13. Sandler M, Bunn AE, Stewart RI. Cross section study of pulmonary function in patients with insulin-dependent diabetes mellitus. Am Rev Respir Dis. 1987; 135: 223–9.
14. Kabitz HJ, Sonntag F, Walker D. Diabetic polyneuropathy is associated with respiratory muscle impairement in type 2 diabetes. Diabetologia. 2008; 51: 191–7.
15. Benbassat CA, Stern E, Kramer M, Lebzelter J, Blum I, Fink G. Pulmonary function in patients with diabetes mellitus. Am J Med Sci. 2001; 322: 127–32.