COMPARISON OF PEAK EXPIRATORY FLOW RATE IN TYPE II DIABETICS WITH NON-DIABETICS
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Abstract: Type II Diabetes mellitus comprises 90 percent of people with diabetes. Like other target organs, lung is also affected by diabetes. This study was done to compare Peak Expiratory Flow rate in diabetics with non-diabetics and to correlate PEFR with duration of diabetes. In this study 40 type II diabetics with the age group of 35-50 yrs with 5-10 yrs duration are compared with 40 non-diabetic groups. PEFR was done by using mini Wrights Peak Flow meter. The results were analyzed using students t test and Pearsons correlation coefficient test. PEFR showed significant reduction in Type II diabetics, when compared to non-diabetic groups. PEFR also showed negative correlation with the duration of diabetes. Reduction in pulmonary function and its negative correlation might be due to respiratory muscle weakness. Hence, regular breathing exercises and strict glycemic control would improve the lung function in diabetics.

Keyword: Type II Diabetes, PEFR, mini Wrights Peak Flow meter

INTRODUCTION: Diabetes Mellitus is a complex medical syndrome that results from diverse aetiologies predominantly of genetic and environmental origin[1]. There is an alarming increase in the incidence and prevalence of Diabetes Mellitus particularly in Asian Indians. The prevalence of Diabetes for all age groups worldwide was 2.8% in 2000 and is estimated to reach 4.4% by 2030[2]. India is the second most populous country in the world that has higher number of people with Diabetes[3]. Presently the Diabetic population in India is estimated to be approximately 32 millions[4]. Type II DM is the commonest type of Diabetic Mellitus. It accounts for almost 90% of diabetes and is largely the result of excess body weight and physical inactivity[5]. It is characterized by insulin resistance and impaired insulin receptors. Diabetes Mellitus is associated with long term damage, dysfunction and failure of various organs such as kidney, nervous tissue, eye, heart etc[6]. The pathogenesis of diabetic complications are mostly due to micro and macro vascular damage of the target organs and non-enzymatic glycosylation of tissue proteins. This process results in impaired collagen and elastin cross-linkage with a reduction in strength and elasticity of connective tissue. The presence of an abundant connective tissue and an extensive micro vascular circulation in the lung raises the possibility that lung may be a "target organ" in diabetic patients[7]. This chronic disease may increase the susceptibility and severity of systemic inflammation of lung and ultimately cause peripheral airway obstruction. The magnitude of the complications of this disease is related to its duration[8]. Thus, the present study was done by doing a simple, non-invasive pulmonary function test the Peak Expiratory Flow Rate by using a Mini Wright's Peak Expiratory Flow Meter in Type II DM and to correlate with the duration of diabetes.

AIM AND OBJECTIVES:
To compare PEFR in Type II Diabetics with non-diabetic groups.
To correlate PEFR with duration of diabetes.

MATERIALS AND METHODS:
The study protocol was approved by ethical committee of the institution. The study was conducted between June and December 2012. 40 Type II diabetic patients were selected from the diabetic outpatient department of age group 35-50 yrs with duration of diabetes between 5-10 yrs. 40 healthy volunteers of the same age group were randomly selected from the general population. Subjects with the history of smoking, hypertension, recent upper respiratory tract infection, ischemic heart disease, bronchial asthma were excluded from the study.

Informed consent was obtained from all the subjects prior to their participation in the study. After obtaining a detailed history, diabetic patients with the duration of 5-10yrs were compared with the non-diabetics. Anthropometric measurements like height, weight were measured and BMI was calculated. After complete physical examination, PEFR was measured by using mini Wright’s Peak Expiratory Flow Meter (Clement Clarke International Model CE 0120).

It is a portable device that can be used at the bedside. It is a hollow tube consisting of movable indicator. The movable indicator is deflected in proportion to the velocity of air flowing through the device. The resistance is provided by an orifice. Peak expiratory flow is then read directly from a calibrated scale[9].

Figure No: 1 Mini Wright’s Peak Flow Meter

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The test was performed in standing position by holding the mini Wright’s Peak Expiratory Flow meter horizontally. The subjects were asked to place their lips tightly around the disposable mouth piece. Then the subject was asked to take a deep breath and exhale as forcefully as possible in a single blow into the instrument. The procedure was repeated thrice with an interval of two minutes between each attempt and the result was recorded in litres per minute. The best of the three recordings was taken. The data collected was statistically analyzed with student’s t test. P value less than 0.05 was considered as statistically significant. PEFR was correlated with the duration of diabetes by using Pearson’s Correlation coefficient test. RESULTS: Out of 80 participants in the study, 40 were diabetics and 40 were non-diabetics.

Table No 1: Age and Anthropometric parameters of diabetic and non-diabetic groups

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Non-diabetic group n=40 mean±SD</th>
<th>Diabetic group n=40 mean±SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>42±5.14</td>
<td>46±6.2</td>
<td>0.06</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>167±5.67</td>
<td>167±5.83</td>
<td>0.9</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>68±10.9</td>
<td>68±10.95</td>
<td>0.2</td>
</tr>
<tr>
<td>BMI</td>
<td>23.46±5.8</td>
<td>24.40±6.91</td>
<td>0.12</td>
</tr>
</tbody>
</table>

The mean and standard deviation of age in diabetic and non-diabetic group was 45.55±4.52 and 42.65± 5.14 yrs respectively. It showed no significant difference. The mean of anthropometric parameters also showed no significant difference.

The mean and standard deviation of PEFR in diabetic and non-diabetic groups were 210.88±67.43 and 314.25±36.71 L/mt respectively. It was found to be reduced significantly in the diabetic group (P=0.001).

DISCUSSION: Diabetic mellitus is an important non-communicable chronic disease of global importance. Type II diabetes is the commonest and accounts for 90% of diabetes. It is a systemic disease that involves the lung as like as the kidney, eyes and nerves. The presence of extensive pulmonary micro vascular circulation and abundant connective tissue raises the possibility that the lung may be a target organ. The magnitude of the complication of diabetes is related to its duration. In this study pulmonary function parameter, PEFR is compared diabetic and non-diabetics and PEFR is correlated with duration of the disease. In the present study mean and standard deviation values of age and anthropometric measurement showed no significant statistical difference. The present study showed significant reduction of PEFR values in diabetic groups when compared with non-diabetic groups. Similar results were shown in the study conducted by Dhawarkar et al who found that mean value of PEFR in diabetics was 310 L/mt and for non-diabetics it was 364 L/mt. The study is also congruent with the result of Ali M.O et al, who showed reduced values of PEFR in diabetic male especially. Similar results were also observed by Timothy M.E. Davis et al, Sanjeev sinha et al, Mee SA et al who showed no significant reduction of PEFR in diabetic groups, which is contrary to this study. This contradiction might be due to smaller sample size in their study. The present study is also in accordance with the Nandhini R et al, Wendy A Davis et al, Banu S et al.

In the present study PEFR showed negative correlation with the duration of diabetes. The study is also congruent with those of Shravya Keerthi G et al, Ali M.O et al, who showed negative correlation.

CONCLUSION: The present study shows significant reduction of PEFR in diabetics, when compared with non-diabetics. In this study PEFR shows negative correlation with the duration of diabetes. The mechanism for this reduction of PEFR in diabetic group may be due to respiratory muscle weakness. Chronic hyperglycemia causes fibrous tissue formation in the chest wall and bronchial tree protein by non-enzymatic glycation, which leads to airway obstruction.
Thus, recording of this simple, non-invasive test would help to assess the prognosis of Type II diabetes clinically. Regular breathing exercises to strengthen the respiratory muscles and strict glycemic control would improve the pulmonary function in Type II diabetes.

**BIBLIOGRAPHY:**