INTRODUCTION:
Alternate period of eating and extended fasting is called intermittent fasting. This term has become quite popular over the past decade. Studies have shown that intermittent fasting decreases blood pressure, body weight, appetite, inflammation and insulin levels. It also improves insulin sensitivity and lipid profiles. Intermittent fasting can be done by two ways. First method is by fasting 24 hour, once or twice a week i.e. alternate day fasting or 5:2 diet. Second method is by eating daily in a fixed restricted time duration (8 to 10 hours) followed by fasting everyday for 14-16 hour. Second method is known as time restricted eating. Time restricted eating is considered as a better method because it is practically convenient to implement on people for a longer period of time. Time restricted eating has minimal restriction on calorie intake than the other types of intermittent fasting. A study had shown that 6 hours of time restricted eating for 5 weeks did not lead to weight loss, but showed increased insulin sensitivity and β-cell function and decreased blood pressure, post-prandial insulin, appetite and oxidative stress. So time restricted eating can improve human health without reduction in weight.

Health benefits of time restricted eating were found to be much better if it is implemented in the early hours of the day than the late hours. It is because of circadian system of human body which keeps a 24 hour rhythm in human physiology, metabolism and behavior. Insulin sensitivity and thermic effect of food is high in early morning hours. Serum cortisol, insulin, and growth hormone levels reaches maximum in the morning and decreases in the evening. This implicates that serum cortisol, insulin, and growth hormone levels reaches maximum in the morning and decreases in the evening. This implicates that it is implemented in the early hours of the day than the late hours. It is because of circadian system of human body which keeps a 24 hour rhythm in human physiology, metabolism and behavior. Insulin sensitivity and thermic effect of food is high in early morning hours. Serum cortisol, insulin, and growth hormone levels reaches maximum in the morning and decreases in the evening.

MATERIAL AND METHODS:
Total 38 confirmed diabetic patients (25 males and 13 females) having body mass index more than 25 were identified after exclusion of any liver or kidney disease, carcinoma, major surgery, hypothyroidism, patients on psychiatric medication, major heart attack and patients on insulin. Their body weight, blood pressure was recorded and fasting blood sample was taken for fasting glucose, HbA1c level, fasting and postprandial glucose level. Two hour blood sample was taken after drinking 75 g glucose in 300 ml water for testing glucose tolerance. They were counseled to follow 10 hr eating window period from 7am to 5pm for 12 weeks without changing their diet, medication, physical activity, sleep duration. They were motivated by revealing health benefits mentioned in earlier studies. During the 10 hour eating window period, there were no restrictions on quantities or types of foods consumed. During fasting period they were asked to take enough water. They were asked to note down time at the start of breakfast and at the end of dinner so to assess their adherence to the 10 hour window period.

RESULTS:
Calculation of adherence: Total number of patients=38. Total number of days: 12×7=84 days. Total patient days: 38×84=3192. Total number of successfully followed 10 hour window: 2715 patient days. Adherence: 2715/3192×100=85.05%.

KEYWORDS
Early time restricted eating, diabetes, obesity

Table 1: eTRE: Early time restricted eating, SEM: Standard error of mean, SE: Standard error, CI: Confidence interval, MD: Mean difference

<table>
<thead>
<tr>
<th></th>
<th>Before eTRE</th>
<th>SEM</th>
<th>After eTRE</th>
<th>SEM</th>
<th>Mean difference</th>
<th>SE of mean difference</th>
<th>95% CI of MD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body wt.</td>
<td>84.5 ± 12.8</td>
<td>2.0764</td>
<td>81.7 ± 12.2</td>
<td>1.9791</td>
<td>2.8</td>
<td>2.8685</td>
<td>-2.91--8.51</td>
<td>0.3322</td>
</tr>
<tr>
<td>BMI</td>
<td>28.5 ± 2.4</td>
<td>0.3893</td>
<td>27.7 ± 2.1</td>
<td>0.3407</td>
<td>0.8</td>
<td>0.5173</td>
<td>-0.23--1.83</td>
<td>0.1262</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>126.5 ± 8.2</td>
<td>1.3302</td>
<td>124.7 ± 7.7</td>
<td>1.2491</td>
<td>4.1</td>
<td>1.8288</td>
<td>0.46--7.73</td>
<td>0.0276</td>
</tr>
<tr>
<td>Diastolic BP</td>
<td>87.2 ± 6.4</td>
<td>1.0382</td>
<td>85.6 ± 6.5</td>
<td>1.0544</td>
<td>1.6</td>
<td>1.4798</td>
<td>-1.34--4.54</td>
<td>0.2832</td>
</tr>
<tr>
<td>Fasting Glu.</td>
<td>162.7 ± 38.3</td>
<td>6.2131</td>
<td>146.2 ± 26.9</td>
<td>4.3638</td>
<td>16.5</td>
<td>7.5924</td>
<td>1.37--31.62</td>
<td>0.033</td>
</tr>
<tr>
<td>PP Glu.</td>
<td>236.6 ± 46.7</td>
<td>5.7257</td>
<td>210.3 ± 42.7</td>
<td>6.9269</td>
<td>26.3</td>
<td>10.2293</td>
<td>5.91--46.08</td>
<td>0.0122</td>
</tr>
<tr>
<td>HbA1c</td>
<td>7.8 ± 1.6</td>
<td>0.2596</td>
<td>7.1 ± 0.9</td>
<td>0.146</td>
<td>0.7</td>
<td>0.2978</td>
<td>0.10--1.29</td>
<td>0.0214</td>
</tr>
<tr>
<td>Tot. Chol.</td>
<td>223.7 ± 48.4</td>
<td>7.8515</td>
<td>212.2 ± 46.5</td>
<td>7.5433</td>
<td>11.5</td>
<td>10.888</td>
<td>-10.19--33.19</td>
<td>0.2944</td>
</tr>
<tr>
<td>LDL Chol.</td>
<td>124.1 ± 40.7</td>
<td>6.6024</td>
<td>118.2 ± 39.5</td>
<td>6.4077</td>
<td>5.9</td>
<td>9.2006</td>
<td>-12.43--24.23</td>
<td>0.5234</td>
</tr>
<tr>
<td>HDL Chol.</td>
<td>48.6 ± 6.1</td>
<td>0.9896</td>
<td>50.1 ± 5.8</td>
<td>0.9409</td>
<td>-1.6</td>
<td>-1.356</td>
<td>-4.22--1.22</td>
<td>0.2886</td>
</tr>
<tr>
<td>Tgs</td>
<td>171.3 ± 56.4</td>
<td>9.1493</td>
<td>163.4 ± 56.8</td>
<td>9.2142</td>
<td>7.9</td>
<td>12.985</td>
<td>-17.97--33.77</td>
<td>0.5448</td>
</tr>
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</table>
DISCUSSION:
Previous studies suggest that time restricted eating reduces body weight, blood pressure and improves insulin sensitivity when time restricted eating is shifted to early hours of the day. This is explained by the circadian system, and eating in alignment with circadian rhythms improves cardio-metabolic health. There was statistically significant decrease in systolic blood pressure after early 10 hours window time restricted eating for 12 weeks. This is accordance with the studies done by Sutton et al. As obesity is a high risk factor for hypertension, time restricted eating should be implemented in both obese and hypertensive patients as it decreases systolic blood pressure. There are evidences that suggest elevated insulin levels may directly increase blood pressure as improvements in blood pressure were found by the reduction in insulin levels. Early time restricted eating also promotes sodium ion excretion by limiting most of the salt intake in early hours of the day when sodium excretion is increased by the circadian system.

There was statistically significant decrease in fasting & postprandial glucose level with reduction in HbA1c level which shows the improvement of insulin sensitivity. This shows early time restricted eating is an effective method to control glucose level in the long term. In early time restricted eating pancreatic beta cells gets enough rest in the night with reduced insulin secretion in night. This results in increased insulin sensitivity of muscles and adipocytes in the morning. Overnight 14 hour fasting may be also responsible for reduction in fasting glucose.

There was no significant difference in body weight and BMI and lipid profile. This is in accordance with the study which showed that early time restricted eating improved insulin sensitivity, blood pressure and oxidative stress even without weight loss. Tinsley et al, Patterson et al reported decreased body weight and improved lipid profile after intermittent fasting. If a person is eating daily in a 10 hour window with no restriction on calorie intake, 12 weeks time is too short to expect any significant differences in body weight, BMI and lipid profile. Longer cohort studies on large population is required to assess these parameters certainly.

LIMITATION:
We considered only diabetic patients with BMI more than twenty five which resulted in decreased sample size. Patients on oral hypoglycemic drugs were included in the study. Patients taking insulin were excluded from the study. Assessment of adherence on 10 hour window was solely based on patient's reporting by writing the daily time of breakfast and dinner on a diary and the calculated adherence was around 85%.

CONCLUSION:
The study concludes that there is reduction of systolic blood pressure, HbA1c level, fasting and postprandial glucose level after 12 weeks of early 10 hour window time restricted eating in pre-obese and obese diabetic patients.

Conflicts of interest: None

REFERENCES:
12. Reim NL, Van Loan MD, Hom WE, Barbieri TF, Mayclin PL. Weight loss is greater with consumption of large morning meals and fat free mass is preserved with large evening meals in women on a controlled weight reduction regimen. J Nutr. 1997;127:75–82.