The glycemic index (GI) is a numeric system of measuring how much of a rise in circulating blood sugar a carbohydrate triggers - the higher the number, the greater the blood sugar response. So a low GI food will cause a small rise, while a high GI food will trigger a dramatic spike. A GI of 70 or more is high, a GI of 56 to 69 inclusive is medium, and a GI of 55 or less is low. Consumption of foods with a high glycemic index (GI) or glycemic load (GL) is hypothesized to contribute to insulin resistance, which is associated with increased risk of diabetes mellitus, obesity, cardiovascular disease, and some cancers.

Finger millet (Eleusinecoracana L.) also known as Ragi. Finger millet contains important amino acids viz, Methionine and Phenyl alanine which are not present in other millet. Finger millet contains important amino acids viz. Methionine and Phenyl alanine which are not present in other millet. Ragi is a great source of iron and pearl millet are low glycemic index.

### Materials and Methods

The present work of dissertation entitled “Development of low glycemic index foods with the use of Pearl millet and Finger millet flours” was conducted in the Nutrition Research Laboratory of Department of Foods and Nutrition, Ethelind School of Home Science, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad.

Procurement of ingredients: Procurement of raw materials: Pearl millet and Finger millet were purchased from the local market of Allahabad.

### Formulation of food products:

The proportions of the ingredients used are mentioned in the Table 1.

<table>
<thead>
<tr>
<th>Products and incorporation level of Finger millet and Pearl millet flours by substituting main ingredient.</th>
<th>Uthapam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products Treatment</td>
<td>Semolina</td>
</tr>
<tr>
<td>Uthapam</td>
<td>100%</td>
</tr>
<tr>
<td>T1</td>
<td>40%</td>
</tr>
<tr>
<td>T2</td>
<td>30%</td>
</tr>
<tr>
<td>T3</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Pick, wash and soak the semolina for 1 hour**

**Add water to make thick batter**

**Mix onion, tomato and green chilli pieces also**

**Heat non-stick pan & spread a little oil on it**

**Then spread the batter properly**

**Pour few drops of oil again on the side of the set batter**
Spread curry leaves and fry mustard seeds over the uthapam.
Fry both the sides till crispy and golden. 

Table 2. Formulation for Cheela

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Products and incorporation level of finger millet and pearl millet flours by substituting main ingredient.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheela</td>
<td>Besan Pearl millet Flours Finger millet flours Tomato Onion</td>
</tr>
<tr>
<td>T₀ (control)</td>
<td>100% -</td>
</tr>
<tr>
<td>T₁</td>
<td>40% 20% 20% 10% 10%</td>
</tr>
<tr>
<td>T₂</td>
<td>30% 25% 25% 10% 10%</td>
</tr>
<tr>
<td>T₃</td>
<td>20% 30% 30% 10% 10%</td>
</tr>
</tbody>
</table>

Take Bengal gram flours in a bowl
Add water to make thick batter
Mix onion and tomato pieces also
Heat non-stick pan & spread a little oil on it
Then spread the batter properly
Pour few drops of oil again on the side of the set batter
Fry both the sides till crispy and golden.

2. Subjects
Twenty normal subjects aged between 20 to 25 yrs (female) students of SHIATS were selected. They were clinically normal and non-diabetic. They were divided into two groups. One group was given Uthapam as Test food and control food and the other group was given Cheela as Test food and control food. The subjects was appraised about the experiment and their consent was taken.

Ethical Approval
The protocol was approved by Institutional Ethical Committee for Biomedical Research on Human Participants, Faculty of Health Science, SHIATS.

Analysis of blood glucose in the subjects
All subjects for investigation fasted overnight (10-12) hr. Their blood sample was collected through finger prick using a hypodermic needle. Each blood sample was inserted into a calibrated glucometer (Accu-check/one touch) which (principle in Appendix F) gave direct reading after 45 seconds based on glucose oxidase assay method. The determination of blood sugar will be taken at intervals i.e. 0 fasting, 15mins, 45mins, 60mins, 90mins, and 120mins after feeding the experimental diets.

Experimental diets
(i) Reference foods:
After fasting for 10-12 hours, subjects were required to arrive at the laboratory at 8 O’clock in the morning and a blood sample was obtained. Fasting blood sugar was estimated and postprandial blood sugar was taken at 15, 30, 45, 60, 90, and 120 minutes after consumption of 50g glucose dissolved in 200 ml drinking water.

(ii) Control food:
Uthapam and Cheela (control food containing 50g carbohydrate) standardized in the Nutrition lab was used as control food. Fasting blood glucose of the subjects after 10-12 hours overnight fasting was obtained and postprandial blood sugar (PPBS) was taken at 15, 30, 45, 60, 90, 120 minutes interval after consumption of test food. One group was given Uthapam as control food and the other group was given Cheela as control food.

(iii) Test food (Finger millet and Pearl millet flours based Uthapam and Cheela):
Uthapam and Cheela developed by incorporating Finger millet at 20% and Pearl millet at 25% percent level was taken as a test food as it scored best in terms of organoleptic characteristics.

RESULT AND DISCUSSIONS
Fig 4. (a) Postprandial blood sugar (PPBS) values were highest for reference food at 45 minutes followed by control uthapum and least values were reported for pearl millet and finger millet flours based uthapum (ranging between 71.1-90.8 mg/dl)

Fig 4. (b). Results shows that PPBS values of reference food ranged between 80 to 125.1 mg/dl with the peak value at 60 minutes. Peak values for reference food, control food and test food were highest at 60 minutes. The peak for test food (90.9) was lowest in comparison to control food (92.4) PPBS was highest for reference foods followed by control cheela and finger millet and pearl millet flours based cheela respectively.

Table 4. (c). Mean glycemic index of control and developed products prepared finger millet and pearl millet flours.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the products</th>
<th>Control products</th>
<th>Finger Millet and Pearl Millet flours based products</th>
<th>Cal. Value of t</th>
<th>Table value at (5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uthapum</td>
<td>3.91±1.14</td>
<td>38.725±1.879</td>
<td>0.47</td>
<td>2.101</td>
</tr>
<tr>
<td>2</td>
<td>Cheela</td>
<td>44.07±1.67</td>
<td>36.83±1.23</td>
<td>3.7</td>
<td>2.101</td>
</tr>
</tbody>
</table>

Fig 4.4. (b). Graphical presentation showing the glucose response area of reference food (glucose), control food (uthapum) and test food (Pearl millet and Finger millet flours uthapum)
Fig. 4. (c). Mean glycemic index of control and developed products prepared by finger millet and pearl millet flours

CONCLUSION
In this study mean IAUC of finger millet and pearl millet flours based Cheela and Uthapam were significantly reduced in comparison to their control product. Finger millet and pearl millet flour based (20% and 25%) Uthapam and Cheela had lower GI i.e. 38.72 and 36.83 respectively in comparison to control Uthapam and Cheela 39.91 and 44.07 respectively. The difference in the glycemic index of finger millet and pearl millet flours based product and control were found highly significant (p<.05).

RECOMMENDATIONS
Low glycemic index food is beneficial for diabetetic patient, obeses and in helpful in several diseases.