Chapter 3
Methodology
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Methodology

This chapter deals with the material and methods used for the study. A sequential account of the means, materials and different methodological procedures adopted for the study has been described under following sub heads.

3.1 Locale of the study
3.2 Sampling procedure
3.3 Research design
3.4 Data collection
3.4 Analysis of data

3.1 Locale of the Study: Uttar Pradesh state of north India was selected as the locale of study.

3.2 Sampling Procedure:

3.2a Selection of area

District Jhansi and adjoining districts of Uttar Pradesh, India was selected purposively. This is the heartland of Uttar Pradesh and this is remote and none of the research work is done in this area related to the subject. Moreover of this it has large number of diabetic population and foods habits of the inhabitants vary from rest parts of the country.
3.2b Selection of institutions:
MLB Medical College Jhansi was purposively selected for the study as it is the biggest medical institution of this area and covers the patients from all over Uttar Pradesh particularly Bundelkhand region, and has special clinic for diabetic patients.

3.2c Selection of respondents
A group of 20 subjects (15-type 2 diabetics and 5, non-diabetic subjects) between the age group 30-50, having average BMI ranging 20-25 was randomly selected for study. The subjects were non-alcoholic and non-smokers. They were free from any other chronic disorder i.e. cardiovascular and other metabolic disorders, which could effect the digestion and metabolism of foods.

3.3 Research Design:
The research Design comprise 2 parts:
3.3a Selection and preparation of specific food
3.3b Determination of glycemic Index

3.3a Selection of specific food:
For the selection of food, random survey was conducted to find the choice and frequency of consumption of different foods and fruits among the diabetic patients, which are generally considered to be avoided in diabetic diet.
Twenty-five most commonly used foods in that community were selected for study. Selected food further were subdivided in the following group-

**Fruits:** Different fruits used in the study as required time to time for the study was purchased in bulk to ensure the uniformity of samples. Quantity of each fruits used were measured for 50g carbohydrate in it because reference food selected was 50 gms of glucose. Selected fruits were *banana, mango, grapes, oranges, dasheri mango, pomegranate, and muskmelon.*

**Juices and beverages:** Required amount of fruit juice was extracted from fresh fruits and beverages like Pepsi, Mirinda were purchased from the local market. Due to the volume of fruit juices only 300-ml were provided, as this is the standard volume of liquid one can take at a time and considered as one serving. Beverages selected for the study were *sucrose, sugarcane juice, oranges, mirinda and pepsi.*

**Mixed foods:** Raw material required for mixed food preparation were purchased in bulk from local market to ensure the uniformity of the samples. Each recipe was prepared with weighed amount of raw material as required for the study time to time. Each recipe was standardized in term of its carbohydrate content, which was equal to 50 g of carbohydrate as of reference food glucose. Mixed foods were further subdivided as follows-

*Cereals and legumes* such as rice and dals were cooked by boiling in minimum of water with 2-g salt.i.e *Khichadi* (*rice and green gram*) and *dal Chawal* (*red gram dal*)
Carbohydrate content was divided as 50% from both major ingredients.

**Breakfast snacks** used in this study such as Samosa, Potato bonda, bread roll were prepared by deep-frying. Purpose of the selection of these three items was to see the changes in the glycemic index of potatoes when used as a mixed meal. In this potatoes were combined with *refined wheat flour, besan and bread* respectively.

**Puri sabzi and bread** was served with *potato vegetable and bread with 10g of butter*. These recipes were prepared by mixing 2 main ingredients and 50-g carbohydrate was calculated as 25 g from one and 25 g from other ingredient.

**Sweets** All sweets were consumed alone. *Gulab Jamun, (khoya+ refined wheat flour ball deep-fried and dipped in sugar syrup), Rasgulla (chenna balls boiled in sugar syrup) Motichoor laddoo (Bundy made with besan by deep frying and laddoo made by adding sugar syrup in it)* were selected for the study in this category as they are the most commonly desired and used sweets in that region.

**Ice cream and chocolate**: commercially marketed vanilla ice cream and milk chocolate from Cadbury used for the study and was purchased from local market.

3.3b Determination of glycemic Index:

The GI of different test meal was determined by comparing their glycemic response with that of glucose, in 20 selected volunteers, aged 43 (SEM 1.9), average height 165 CMS (SEM 1.5) and average weight 63 kg (SEM 3.2) with BMI ranging 20-30. The
subjects were non-alcoholic, non-smokers NIDDM and non-diabetic subjects. They were not having any other disease, which could have affected digestion and metabolism of different foods. Their dietary pattern was elicited by a 24-h recall questionnaire on the day prior to each test day. Selected volunteers then were divided in 4 groups of 3 diabetic and 1 non-diabetic group. Each group consisted of 3 males and 2 females. On the first test day of each group, 50-g glucose dissolved in 200 ml of water was given as reference food. The test meals were given within 4 weeks of a reference food administration, with at least 3 days intervals between feeding of 2 test meals with each group. The meals were served at a set time in the morning (8.00 am) after a 12-h overnight fast to eliminate the effect of previous meal. Each recipe was given separately on a second occasion. The subjects were instructed not to perform any heavy activity 1-day prior to the test and were made to rest for 30 min before being given the test meal. They were also instructed to finish the meal within 10-15 min with proper chewing. They remained on rest and refrained from eating or drinking during the test period of 2-h.

3.4 Data collection

Finger prick samples was obtained with sofistick lancets at 0, 30, 60, 90 and 120 min after the reference glucose and each test meal. The blood glucose was estimated using glucometer (Refolux® S by boehringer). A pretest was carried out indicated no difference and a high degree of correlation between this and the traditional method. These values for reference and each test meals were plotted for each subject and incremental area under curve was calculated using trapezoidal rule. GI of each test meal was calculated using standard method suggested by Jenkins et.al. \[ GI = \left( \frac{\text{Area under curve of test food}}{\text{Area under curve of reference food}} \right) \times 100 \]
3.5 Analysis of data

The data collected was systematically tabulated and plotted for each individual. Mean of glucose tolerance (GTT) of reference food and each test meal was calculated and used for further analysis. Incremental area under curve was calculated for reference glucose of all groups and each test food using trapezoidal rule. Glycemic index of each test food was calculated using standard method suggested by Jenkins et.al. Statistical tools applied to determine the correlation and significance of results obtained were Means, ANOVA, Spearman's and Pearson's rank correlation.