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Chapter-1 Introduction

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the management of diabetes mellitus, diet has been recognized as a cornerstone of the therapy. There is a considerable evidence to show that good control of blood glucose prevents or delay the debilitating complications of diabetes. The use of carbohydrate both in terms of quantity as well as quality in diabetes meal planning has always been a key therapeutic issue. The amount of total carbohydrate recommended for diabetic diet has varied significantly over the years.

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There are many traditional beliefs regarding the type of carbohydrate in the diabetic diet, which in

the

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recent years are questioned. According to traditional thoughts, simple sugars are rapidly digested and absorbed and therefore

people suffering from diabetes mellitus should restrict the amount and preparations containing simple sugars.` Blood glucose levels are raised after food containing carbohydrates (sugars and starch) are eaten. Different rank of carbohydrate counting also affects the blood glucose levels differently. GLYCEMIC INDEX:- The glycemic index (GI) is a relative ranking of carbohydrate in foods according to how they affect the blood glucose levels. Carbohydrates with low GI value are more slowly digested, absorbed and metabolized and cause a lower and slower rise

14 in blood glucose and therefore affects the need and action of insulin uptake by the body. The concept of glycemic index (GI) was proposed by Jenkins and colleagues in 1981 to characterize the rate of carbohydrate absorption after a meal (Jenkins et al. 1981).

GI

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is defined as the area under the glucose response curve after consumption of 50 g carbohydrate from a test food

divided by the area under the curve after consumption of 50 g carbohydrate from a control food, either white bread or glucose (Wolever et al. 1991). Over the past two decades, the GI of most commonly consumed carbohydrate-containing foods has been measured (Foster- Powell and Miller 1995).

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Many factors together, including carbohydrate type, fiber, protein, fat, food form and method of preparation, determine the GI of a particular food (

Bjorck et al. 1994, Estrich et al. 1967, Welch et al. 1987, Wolever et al. 1991). Professor David J.A. Jenkins who is a British born university professor in the department of nutritional sciences at the University of Toronto, Canadain the year 1981 is credited with developing the concept of glycemic index as a way of explaining the way in which dietary carbohydrate impacts the blood sugar. His first paper on subject appeared in the American Journal of Clinical Nutrition in 1981.

According to Jenkins, Diabetes mellitus has various types: Type 1, Type 2, Gestational diabetes mellitus and others such as Maturity onset diabetes in the young (MODY), Latent autoimmune diabetes of adulthood (LADA), What all these disorders have in common is an inherent inability to self- regulate the levels of blood glucose or cellular fuel in the body. Type 2 diabetes, the most common type of diabetes, is also one of the most prevalent chronic disease around. Worldwide, more than 150 million people suffer from the disease; the international diabetes federation projects that this population will double globally by the year 2025, while excess body weight is a major risk

15 factor for type 2 diabetes, ethnic background, family history and certain components of your health profile also play an important role. Type 2 diabetes is not caused by absence of hormone insulin, as in case with type 1 diabetes but it is rather caused by body's inability to use insulin properly. People with type 2 diabetes have a condition called insulin resistance. They can produce insulin, usually in sufficient amount at first ,but it doesn't bind properly to the insulin receptor that is the gateway to cell in muscle, fat, liver tissue and therefore, resistant to its effects. As a result, glucose doesn't enter the cells and instead . The second condition that sets the stage for type 2 diabetes is insulin deficiency- the pancreas also has difficulty producing sufficient amount of insulin to process the rising blood glucose levels. Eventually, it does not have sufficient amounts to overcome the deficit. The toxic effects of long term high glucose levels on the insulin producing beta cells on the pancreas (glucotoxicity) can make insulin deficiency worse. Type 2 diabetes does not strike without warning. Pre-diabetes, also known as impaired glucose tolerance (IGT) or impaired fasting glucose(IFG) precedes the condition by months, years and sometimes by decades. As the name suggests, pre-diabetes is defined by blood glucose levels that are higher than normal but not as high enough to indicate diabetes. The actual clinical criteria for diagnosis of pre diabetes is blood glucose level of 110 to 125 mg/dL as determine by fasting blood glucose test and post prandial (2 hours after meal) rising is to 140- 199mg/dL.(ADA) Pre diabetes is a signal that if lifestyle changes and correction in eating pattern is not done, you are most likely to on the path of full-fledged type 2 diabetes. And having pre-diabetes is a danger in itself. It increases the chances of stroke and heart disease by 50% and may also be associated with an increased risk of colon cancer.

16 According to ADA (American Diabetes Association) one of the reason for the boom in type 2 diabetes is the widening of waistbands and the trend towards a more sedentary lifestyle in developed and developing countries .Increasing cases of obesity and wrong eating habits ,more interest of consuming packed and processed food are also contributing in worsening the condition by 40% and obesity and newly diagnosed cases are increasing rapidly. The progression of type 2 diabetes is associated with risk factors which are : Age and ethinicity:- According to American Diabetes Association, over half of all cases in people over age fifty five and older suffer from type 2 diabetes. Therefore, Individuals over the age of forty five should be tested for diabetes and retested every three years thereafter if the initial test is normal. Family history:- Heridity plays a very important role in development of type 2 diabetes. If you have first degree relative (strong genetic/family) history, chances of developing the disease and its risk doubles. Hypertension and cholesterol levels: Hypertension or blood pressure higher than 140/90 mmHg, is both a possible complication of type 2 diabetes and a risk factor for the development of disease. A large scale of over 12,000 patients published in the New Journal Of Medicine in the year 2000 found that people with diagnosed hypertension were 2.5% most likely to develop type 2 diabetes than those with normal blood pressure and the study also shows the correlation between the beta blockers(a medication used to treat high blood pressure) and an increased risk of type 2 diabetes. Triglyceride

17 levels over 250mg/dL and levels of HDL or (good cholesterol) under 35 mg/dL put you on the risk of type 2 diabetes. Risk associated with weight and BMI:- The ADA suggested that obesity has been on steady rise over the past few decades, with nearly one- third of all adults over the age group of twenty are classified as obese, according to the 1999-2000 National Health And Nutrition Examination Survey (NHANES) Being overweight or obese is a primary risk factor for developing pre diabetes and type 2 diabetes. The U.S Department of Health And Human Services (HHS) reports that over 80% of people with type 2 diabetes are clinically obese. Too much fat makes it difficult for the body to use its own insulin to process blood glucose and bring it to down to normal circulating levels. BMI stands for body mass index- a number to express weight in relationship to height and it is a reliable indicator of overall body fat. People with BMI of 25 to 29.9 are considered overweight. Further obesity is classified on the basis of BMI grading. Extreme obesity is classified as BMI 40 or above 40. The NIDDK (National Institute Of Diabetes And Digestive And Kidney Disease) reports that 67 % of people with type 2 diabetes have a BMI of 27 and above and 46% have a BMI of 30 or higher. BMI range between 18.5 to 24.9 is considered to be normal. The four main reasons are :- 1. Overweight people have fewer available insulin receptors 2. More fat requires more insulin 3. Excess fat promotes further insulin resistance. 4. Fat cells release free fatty acids (FFAs)

18 As discovered by Rockefeller university researcher in 1995, leptin (a hormone in fat cells that helps to metabolize fatty acids) also plays an important role in sending a satiety or full signal to brain to stop eating when body fat increases and an empty signal when body fat is insufficient. The United Nations FAO/WHO has suggested the consumption of healthy diet

as a management and prevention strategy for these diseases and recommends the use of glycaemic index (GI) of food along with information related to food composition so that people can make better food choices (FAO/WHO, 1998, 2015). Foods with high GI are not only responsible for insulin related complications and high lipid concentrations but are also evidenced to be a risk factor for obesity (Schwingshackl and Hoffmann, 2013), depression in women (Gangwisch et al., 2015) and metabolic syndrome which is characterized by abdominal obesity, hyperlipidemia, hypercholesterolemia, hypertension and high fasting blood glucose levels (Song et al., 2014) The criteria of selecting the topic is very significant as diabetes mellitus gets directly affected by quantity and quality of carbohydrate consumed. Diet plays a very significant role in managing diabetes and therefore, ADA (American Diabetes Association)refers to dietary management of diabetes as “MEDICAL NUTRITION THERAPY” (MNT).The food we eat has direct impact on our blood glucose levels and therefore also on diabetes control and its related riskand complications. All about Carbohydrates:- The body began to convert carbohydrate almost entirely into glucose shortly after carb containing foods are eaten. .If there is inadequate or insufficient insulin to help process this glucose into cellular fuel, consuming too many carbohydrate can cause blood glucose to rise to dangerous levels. Without carbohydrate generated glucose you could not function, yet too much can cause irreparable damage.

19 All foods that contain starches/ sugars- including fruits, vegetables, milk, breads, grains, beans, pasta. To avoid carbohydrate containing foods is both impossible and unadvisable- our body needs the important micro nutrient and phytochemicals present in these foods, In fact, WHO recommends that carbohydrate from a variety of foods account for 55 % of total calories in our daily diet. Does it matter what kind of carbohydrate we consume? At one time nutritionist believed that people with diabetes should avoid simple sugars (mono and disaccharides) and eat food containing complex carbohydrate, instead with the mistaken belief that simple sugars would raise glucose levels faster and more dramatically. But now its known that gram for gram, complex carbohydrates found in bread, cereals, potatoes, vegetables, roots and tubers and other food raises the blood sugar approximately the same amount as simple sugar like honey, fructose or table sugar. However, there may be a difference in how rapidly certain foods raise sugar levels. The Glycemic index or GI is a measure of how quickly the carbs in certain foods are digested and transformed into blood glucose. When we talk about diet management in diabetes, the first and foremost thing comes to our mind is climatic conditions, locally grown foods according to type of soil, system and interest developed in eating practices from generations, belief systems, physical activity, eating frequency, type of food, eating habits, local availability ,income group and regional values and culture. As we know there is a trend of consumption of calorie rich diet in western belt of Rajasthan specifically jodhpur and the number of cases of diabetes are increasing rapidly, evaluation of glycemic index of local foods and most frequently consumed

20 foods on regular basis will act as a guideline to make correct food choices both in quality and quantity. The GI of foods does not necessarily correspond to specific carbohydrate “type” – some complex carbohydrate may have higher GI than simple carbohydrate. For people of jodhpur city diagnosed with type 2 diabetes and pre diabetes, the Glycemic index can be an effective tool for avoiding blood sugar spikes. Importance of counselling in management of diabetes: Atherapeutic diet plays an important role in the treatment of diabetes. The diet may be used alone or in combination with insulin or oral hypoglycemic drugs. The diet counselling includes following important parameters :- • Type of carbohydrate • Cooking methods • Portion size • Frequency of meals. • Local availability. • Likes dislikes • Use of fiber in decreasing the later effects of calorie rich food. • Distribution of carbohydrates in every meal. • Including fibre in diet • Combination meals • Stage of diabetes with reference to absence or presence of any other complication.

21 OBJECTIVES:- The study was conducted to determine four important components:- 1. To study the consumption pattern of local foods among the people of Jodhpur city diagnosed with type 2 diabetes mellitus. 2. To list out most commonly consumed local foods by the selected subjects of Jodhpur city. 3. To estimate the Glycemic index of frequently consumed food items. 4. To provide suggestive guideline for making correct choices and portion control in meals to have better diabetes management. (Educational workshop by lecture method)

Chapter-3 METHODOLOGY

56 Chapter – 3 METHODOLOGY he present study was conducted to estimate the glycemic index of local foods consumed by diabetic patients of jodhpur city and its impact on their blood glucose level. Details of the methodology followed for the study have been described below: Locale The study was conducted in Jodhpur city of Rajasthan.. The samples were obtained by —THE ENDO CLINIC‖ – a clinic at Jodhpur city run by a renowned endocrinologist. Sample selection: The entire sample was selected from THE ENDO CLINIC as it has nearly eighty percent of daily OPD of patients from middle to higher income group diagnosed with diabetes mellitus. Therefore, subjects were purposively selected

from this clinic to get the reliable data which justifies the topic of the above study. Sample size: A sample size of total 310 subjects were selected through scattered purposive sampling technique. Subjects were selected using following criteria: T

57 For collecting data on frequent consumption of local food items in their daily meals:- 1. 300 subjects (150 males and 150 females) 2. Age between 35 -45 years. 3. Subjects who were diagnosed with type 2 diabetes mellitus. 4. Willingness to participate in the study. For estimation of glycemic index of listed testing food and reference food. 1. 10 subjects (5 males and 5 females) 2. Age between 30 -40 years. 3. Subjects with normoglycemia (non diabetic)/ normal blood glucose level. 4. Willingness to participate. TOOLS Tools were designed to collect required information from the subjects as per the need of the study. Data collection An interview schedule was developed to obtain the desired information from the subjects, which included :- 1. Socio demographic profile:- This includes the general information about the subjects regarding their age, education andfood habits. 2. 24 hour dietary recall method:- A 24 hour dietary recall (self-administered) questionnaire was developed as per FAO (2018) guidelines in which detail information about the quantity,

58 frequency, intake pattern of foods consumed throughout the day were listed and recorded. 3. Food frequency questionnaire:- Food frequency questionnaire performa (Appendix) was developed to obtain frequently consumed food items in a day ,week or a month. FOOD FREQUENCY TABLE Food items Once a week Twice a week On weekends Once in a month Rarely Poha Upma Besan Paratha Besan cheela Raab Patoliya Gatte ki sabji Pittor ki sabji Papad ki sabji Bdi ki sabji Kabuli Dal Bati Mirchiwada Kachori Samosa

59 PLATE – 1 Plate showing test foods Poha and Upma

60 PLATE – 2 Test food besan paratha and besan cheela

61 PLATE – 3 Test food raab and patoliya

62 PLATE – 4 Test food gatte and pittor ki sabji

63 PLATE – 5 Test food papad and badi ki sabji

64 PLATE – 6 Test food kabuli and dal bati

65 PLATE – 7 Test food mirchiwada, kachori and samosa

66 Tools used for the estimation of glycemic index of listed foods:- Glycemic index formula given by Jenkins et.at 1981 was used in the study. Where, IAUC is incremental area under curve. Test food is 50 g digestible carbohydrate from test food. Reference food is 50 g glucose. (For reference food, 50g of dextrose (Glucon−D glucose powder, Heinz India (P) Ltd., Mumbai, India) was dissolved in 200 ml of water and was given to subjects.) To calculate the incremental area under curve IAUC, a mathematical rule called trapezoid rule is used for calculation of IAUC. TRAPEZOID RULE IS CALCULATED BY USING THE FORMULA GIVEN BELOW :- ½ × (SUM OF PARELLEL LINES) × WIDTH OGTT(Oral Glucose Tolerence Test)Tool: OGTT was performed by using pre calibrated automatic lancet device-SD Code free blood glucose meter, produced by SD Biosensor , a diagnostic company from South Korea. This meter is used in the recording of sample as it meets the 2013 ISO standards for blood glucose meter accuracy. Fating state blood samples were taken by finger pricked capillary method at zero minute which was taken as baseline. The subjects were then asked to consume the reference / test food. Time was noted and further blood samples were obtained at 0 hour, 1 hour and 2 hour time frame.

67 The blood glucose respone curves were plotted for the reference and test foods. Further IAUC (incremental area under curve) were calculated geometrically using the trapezoid rule (FAO/WHO 1995). PLATE – 8 Plate showing reference food glucose

68 PLATE – 9 Electronic glucometer used for capillary blood test

69 PLATE – 10 Finger pricking and sample collection and Glucometer reading

70 FLOWCHART OF THE STEPS FOLLOWED FOR THE REFERENCE AND TEST FOOD CONSUMPTION. CONSUMPTION OF REFERENCE FOOD AND BLOOD SUGAR RESPONSE MEASURED ↓ After 2 days CONSUMPTION OF TEST FOOD 1 AND BLOOD SUGAR RESPONSE MEASURED ↓ After 2 days CONSUMPTION OF TEST FOOD 2 AND BLOOD SUGAR RESPONSE WAS MEASURED ↓ After 2 days CONSUMPTION OF n…..TEST FOODS AND BLOOD SUGAR RESPONSE WAS MEASURED TABLE SHOWING INGREDIENTS OF TEST FOOD Poha Weight (g) Carbohydrate (g) Poha 60 46.38 Tomato 20 0.72 Peanuts 10 2.67 Oil 10 0 Upma Weight (g) Carbohydrate (g) Semolina 65 48.62 Tomato 20 0.72 Onion 10 2.52 Ghee 10 0

71 Besan paratha Weight (g) Carbohydrate (g) Gram flour 20 12.18 Wheat flour 55 38.17 Oil 10 0 Besan cheela Weight (g) Carbohydrate (g) Gram flour 80 48.72 Green chilli 5 0.45 Coriander 5 0.31 Oil 10 0 Raab Weight (g) Carbohydrate (g) Bajra

flour 72 48.6 Buttermilk 250ml 1.2 Patoliya Weight (g) Carbohydrate (g) Bajra flour 75 50.06 Ghee 15 0 Gatte ki sabji Weight (g) Carbohydrate (g) Gram flour 80 48.72 Curd 50 1.5 Oil 15 0 Pittor ki sabji Weight (g) Carbohydrate (g) Gram flour 80 48.72 Curd 50 1.5 Oil 15 0 Papad ki sabji Weight (g) Carbohydrate (g) Urad dal(2 papads) 80 50.08 Oil 10 0

72 Badi ki sabji Weight (g) Carbohydrate (g) Moong dal(10 small nuggets) 88 49.8 Oil 10 0 Khichdi (kabuli) Weight (g) Carbohydrate (g) Rice 45 35.1 Bread(1/2 slice) 10 5.1 Cashew 10 2.23 Ghee 15 0 Gatte 10 6.9 Paneer 10 0.24 Dal bati Weight (g) Carbohydrate (g) Dal 25 14.9 Bati 50 34.7 Ghee 10 0 Mirchiwada Weight (g) Carbohydrate (g) Gram flour 75 45.67 Potato 20 4.52 Oil 60 0 Green chilli 5 0.45 Kachori Weight (g) Carbohydrate (g) Refined flour 55 40.6 Mogar dal 15 9.01 Oil 50 0 Samosa Weight (g) Carbohydrate (g) Refined flour 60 44.3 Cashew 10 2.23 Potato 20 4.52 Oil 60 0

73 Coping Tool: Group Counselling through lecture method: On the basis of research findings, a coping tool was developed in which all the selected diabetic subjects who participated in the study were called and through lecture method and on the basis of medical nutrition therapy given by American Diabetes Association, group counselling was conducted to educate subjects about understanding carbohydrate quality and quantity, its effects after digestion, knowing the portion size, understanding immediate and delayed blood glucose response, understanding importance of right selection of food and making correct choices, understanding non - scientific myths regarding specific food consumption at regional level and above all, most importantly understanding the response of local foods available and prepared at home and its effects on their blood glucose levels thus resulting in making wise choices while selecting and making food choices for their daily plate of meal. Counselling points included :- ➢ Type of carbohydrate. ➢ Amount of fibre ➢ Type of preparation ➢ Cooking methods ➢ Importance of fibre in meal was discussed as itincreases theintestinal transmit time, delays gastric emptying and slows down glucose absorbtion. ➢ Refined foods like sooji, maida should be avoided as they are low in fibre and hence increases faster breakdown of sugars and starches resulting in high glucose levels. ➢ Smaller the particle size, more is the glycemic effect.

74 ➢ Raw foods having larger particles, therefore have a lower effect than cooked homogenized foods. ➢ Foods cooked by dry and short time methods like roasting have a lesser glycemic effects as compared to foods cooked by boiling and long coking process which reduce particle size. ➢ Preparations like roasted chana, chapatis, sprouts and whole fruits are more suitable than khichri or boiled rice. ➢ Misconceptions regarding gram flour(as its said besan reduces blood glucose level post meal) was proved wrong in the above study as test foods like mirchiwada and besan cheela are high in G.I. whereas besan parantha which has mixed grain was comparatively less on G.I. scale in the result.

75 PLATE – 11 Counselling session 1

76 PLATE – 12 Counselling session 2

77 PLATE – 13 Counselling session 3

78

Percent was used for presenting information regarding background. Mean values were calculated for the data obtained from food frequency questionnaire as to assess the frequency of consumption of local food pattern . T – test for difference between two means was applied for assessing the difference between reference food and test food . Coefficient of correlation was used to find out relationship between reference food and test food. Formulas used for analysis of data are given below (Gupta, 1992) Mean = ∑ ∑X= Sum of all the observation values N= Total number of items

for difference between two means: In experimental work, generally it becomes necessary to test whether two samples differ from one other significantly in their means or whether they may be regarded as belonging to same population. ( ) √ ( ) ( ) x 1 = mean of reference food x 2 = mean of test food S 1 = standard deviation of reference food S 2 = standard deviation of test food n = number of items Coefficient of correlation When two variables cannot be considering the light

of dependence , and independence , in such cases with fair certainty that there is a relation of some sort and the type of relation is to be estimated along with the extent of two variables varying together sand influencing each other, coefficient of correlation is used . A measure of the degree of the relationship between the two variables which may be independent of any particular unit is needed . Karl Pearson developed such a

80 coefficient which may measure the degree of relationship or association This coefficient is Coefficient of Correlation and is denoted by r, its formula is given as under— (∑) (∑)(∑) √[∑ (∑)][∑ (∑)] r = coefficient of correlation n = number of subjects x and y are the obtained raw scores of the subjects respectively.

Chapter-4 RESULTS AND DISCUSSION

82 Chapter – 4 RESULTS AND DISCUSSION The present study was carried out at THE ENDO CLINIC of Jodhpur city, Rajasthan to estimate glycemic index of local foods consumed by diabetic patients of jodhpur city and its impact on their blood glucose level. Accordingly, a total 310 subjects were studied out of which 150 males and 150 females aged between 35-45 years were selected. The data includes general information on the basis of age, education, eating habits. The more emphasis was given over the consumption pattern of local foods on the basis of their daily meal pattern so as to list out the frequently consumed food items. General information:- On the basis of table no.4.1, 4.2 and 4.3 information regarding age, education and eating habits are shown in percentage with respective graphical representation. Percentage distribution of foods on the basis of their consumption frequency (Table 4.4 –Table 4.18) The first part of the study included 300 samples. Out of which 150 males and 150 females aged 35-45 years. On the basis of food frequency questionnaire and 24 hour dietary recall questionnaire.

83 Table 4.1 Percentage distribution of subjects as per age. Age Male subjects (n = 150) (In %) Female subjects (n = 150) (In %) Age 35=40 years 41.33 24 Age 40-45 years 52 76 Table 4.1 shows those 41%

males and 24% females

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were under the age group of 35-40 years whereas 52% males and 76% females were under the age group of 40- 45 years

of age. Percentage distribution of subjects as per age 80 70 60 50 40 Age 35=40 years Age 40-45 years 30 20 10 0 Male subjects Female subjects Percentage

84 Table 4.2 Percentage distribution of subjects on the basis of education. Education Male subjects (n = 150) In % Female subjects (n=150) In % Literate 100 100 Illiterate 0 0 Table no. 4.2 shows percentage mean of subjects on the basis of education. the table shows that both the subjects were under the category of literate. None of them was under illiterate category.

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Percentage distribution of subjects on the basis of Education 100 90 80 70 60 50 40 30 20 10 0 Literate Illiterate Male subjects Female subjects Percentage 85 Table 4.3 Percentage distribution of subjects on the basis of

eating habits. Eating habits Male subjects (n=150) In % Female subjects (n=150) In % Vegetarian 100 100 Non vegetarian 0 0 Table 4.3 shows percentage distribution on the basis of eating habits, where both the subjects were under vegetarian category. Eating Habits 100 90 80 70 60 50 40 30 20 10 0 Vegetarian Non vegetarian Male subjects Female subjects Percentage

86 Table 4.4 Percentage distribution of subjects on the basis of consumption frequency of breakfast items listed below: Breakfast item Poha Male subjects (n=150) In % Female subjects (n=150) In % Once a week 42 46 Twice a week 32 27.33 On week ends 20 16 Monthly once 12 6.66 Rarely 10.66 4 Table 4.4 showed that the maximum in take frequency was once a week where in males it was 42% and in female subjects it was 46% respectively. Consumption frequency - Poha 50 45 40 35 30 25 20 15 10 5 0 Male subjects Female subjects Once a week Twice a week On week Monthly Rarely ends once Percentage

87 Table 4.5 Breakfast item Upma

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Male (n=150) % Female (n= 150) % Once a week 40 25.33 Twice a week 32.66 20

On week ends 15.33 30 Monthly once 8 21.33 Rarely 4 3.33 Table no. 4.5 of test food UPMA showed maximum intake frequency of once a week which in males was observed 40% whereas in females frequency was on weekends which was observed 30%. Consumption Frequency - Upma 40 35 30 25 20 15 10 5 0 Series1 Series2 Once a Twice a On week week week ends Monthly once Rarely Percentage

88 Table 4.6 Breakfast item Besan parantha Male (n=150) % Females (n=150) % Once a week 37.33 34 Twice a week 28 25.33 On week ends 18 18 Monthly once 12.66 16.66 Rarely 4 6 Table 4.6 of test food BESAN PARANTHA showed maximum intake once a week in males and females where in males it was observed 37.33% and in females it showed 34%. Consumption frequency - Besan Parantha 40 35 30 25 20 15 10 5 0 Male (n=150) Females (n=150) Once a week Twice a week On week Monthly Rarely ends once Percentage

89 Table 4.7 Breakfast items Besan cheela Male (n =150) % Females (n=150) % Once a week 32 35.33 Twicea week 22.66 24.66 On week ends 21.33 14.66 Monthly once 18.66 18.66 Rarely 5.33 6.66 Table 4.7 of test food BESAN CHEELA showed maximum intake frequency of once a week in both subjects, in males it observed 32% and in females it was 35.33%. Consumption frequency - Besan Cheela 40 35 30 25 20 15 10 5 0 Male (n =150) Females (n=150) Once a week Twicea week On week Monthly Rarely ends once Percentage

90 Table 4.8 Breakfast item Raab

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Male (n=150) % Female (n=150) % Once a week 36 44.66 Twice a week 30.66 22.66

On week ends 15.33 8.99 Monthly once 26.66 20.66 Table 4.8 of test food RAAB showed maximum intake frequency of once a week in both the subjects, in males mean percentage was observed 36% and among females it was 44.66%. Consumption frequency - Raab 45 40 35 30 25 20 15 10 5 0 Male (n=150) Female (n=150) Once a week Twice a On week Monthly week ends once Percentage

91 Table 4.9 Breakfast item Patoliya Male (n=150) % Females (n=150) % Once a week 38 32.66 Twice a week 19.33 24.66 On week ends 20 17.33 Monthly once 22.66 16.06 Rarely 16.66 14.66 Table 4.9 of test food PATOLIYA showed maximum intake frequency of once a week in both the subjects, in males it was observed 38% and in females it was 32.66%. Consumption

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frequency - Patoliya 40 35 30 25 20 15 10 5 0 Male (n=150) Females (n=150) Once a week Twice a week On week Monthly Rarely

ends once Percentage

92 Table 4.10 Percentage distribution of subjects on the basis of frequently consumption of local vegetables / homemade recipes in lunch. Local vegetables consumed in lunch Gatte ki sabji

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Male (n=150) % Female (n=150) % Once a week 25.33 29.33 Twice a week 27.33 33.33

On week ends 42.66 25.33 Monthly once 16 24.66 Rarely 2.66 4 Table 4.10 of test food GATTE KI SABJI it was observed that in male subjects maximum intake is on weekends which was observed 42.66% and among females maximum intake was twice a week which showed 33.33%. Consumption frequency Gatte ki Sabji 45 40 35 30 25 20 15 10 5 0

83% MATCHING BLOCK 15/24 SA Sona thesis.doc (D21444835)

Male (n=150) Female (n=150) Once a Twice a On week Monthly Rarely

week week ends once Percentage

93 Table 4.11 Local veg consumed in lunch Pittor ki sabji

100% MATCHING BLOCK 13/24 SA Sona thesis.doc (D21444835)

Male (n=150) % Female (n=150) % Once a week 36 32.66 Twice a week 25.33 24.66

On week ends 20 19.33 Monthly once 27.33 26.66 Rarely 8 13.33 Table 4.11 of test food PITTOR KI SABJI showed maximum intake frequency of once a week in both the subjects where in males it was observed 36% and females it was 32.66%. Consumption frequency Pittor Sabji 40 35 30 25 20 15 10 5 Male (n=150) Female (n=150) 0 Once a Twice a On week week week ends Monthly once Rarely Percentage

94 Table 4.12 Local vegetables consumed in lunch Badi (Moong dal nuggets) Male (n=150) % Females (n=150) % Once a week 44.66 58.66 Twice a week 12.66 25.33 On weekends 22 12 Monthly once 32.66 16.66 Rarely 4.66 4 Table 4.12 of test food MOONG DAL BADI showed maximum intake frequency of once a week in both the subjects, in males the mean observed was 44.66% and in females it was 58.66%. Consumption frequency - Badi (Moong Dal Nuggets) 60 50 40 30 20 Male (n=150) Females (n=150) 10 0 Once a week Twice a On Monthly Rarely week weekends once Percentage

95 Table 4.13 Local veg consumed in lunch Papad ki sabji

100% MATCHING BLOCK 14/24 SA Sona thesis.doc (D21444835)

Male (n=150) % Female (n=150) % Once a week 48.66 40.66 Twice a week 26 22

On week ends 12 16 Monthly once 20 21.33 Rarely 10 16.66 Table 4.13 of test food PAPAD KI SABJI showed maximum intake frequency of once a week in both subjects, in males it was observed 48.66% and in females it was observed 40.66%. Consumption frequency - Papad ki Sabji 50 45 40 35 30 25 20 15 10 5 0 Male (n=150) Female (n=150) Once a Twice a On week week week ends Monthly once Rarely Percentage

96 Table 4.14 Percentage distribution of subjects on the basis of frequently consumed local street snacks . Consumption pattern of Local street snacks Mirchiwada

100% MATCHING BLOCK 16/24 SA Sona thesis.doc (D21444835)

Male (n=150) % Female (n=150) % Once a week 46 34.66 Twice a week 22.66 11.33

On week ends 36 26.66 Monthly once 5.33 36 Rarely 6.66 8 Table 4.14 of test food MIRCHIWADA showed maximum intake frequency of once a week, in male sit was 46% wheras in female subjects it was 34.66%. Consumption frequency snacks - Mirchiwada 50 45 40 35 30 25 20 15 10 5 0

78% MATCHING BLOCK 17/24 SA Sona thesis.doc (D21444835)

Male (n=150) Female (n=150) Once a week Twice a week On week Monthly Rarely

ends once Percentage

97 Table 4.15 Consumption frequency of local street food Mogar kachori (small) Male (n=150) % Females (n=150) % Once a week 29.33 14 Twice a week 12 10.66 On week ends 36.66 40.66 Monthly once 30.66 45.33 Rarely 8 6 Table 4.15 of food MOGAR KACHORI showed maximum intake frequency in males was 36.66% (on week ends) wheras in females it was observed monyhly once at 45.33%. Consumption frequency snacks - Mogar Kachori Small 50 45 40 35 30 25 20 15 10 5 0 Male (n=150) Females (n=150) Once a week Twice a week On week Monthly Rarely ends once Percentage

98 Table4.16 Consumption frequency of local street foods Samosa (small)

100%	MATCHING BLOCK 18/24	SA	Sona thesis.doc (D21444835)

Male (n=150) % Female (n=150) % Once a week 12 14 Twice a week 8.99 6.66

On week ends 52.66 21.33 Monthly once 34 51.33 Rarely 9.33 23.33 Table 4.16 of food SAMOSA it showed on week ends frequency of 52.66% in males whereas monthly once frequency in females of 51.33% Consumption frequency snacks - Samosa Small 60 50 40 30 20

78%	MATCHING BLOCK 19/24	SA	Sona thesis.doc (D21444835)

Male (n=150) Female (n=150) 10 0 Once a week Twice a week On week Monthly Rarely

ends once Percentage

99 Table 4.17 Percentage distribution of subjects on the basis of consumption frequency of occasional local delicacies. Local occasional delicacies Khichdi (marwadi pulav with vegetables)

100%	MATCHING BLOCK 21/24	SA	Sona thesis.doc (D21444835)

Male (n=150) % Female (n=150) % Once a week 32.66 37.33 Twice a week 8.99 12

On week ends 30.66 44.66 Monthly once 39.33 20.66 Rarely 5.33 2 Table 4.17 of food KHICHDI showed intake frequency of monthly once in males with 39.33% whereas in female subjects it was onbserved 44.66% on week ends. Consumption frequency - Khichdi (Marwari Pulav with Vegetables) 50 40 30 20

78%	MATCHING BLOCK 20/24	SA	Sona thesis.doc (D21444835)

Male (n=150) Female (n=150) 10 0 Once a week Twice a week On week Monthly Rarely

ends once Percentage

100 Table 4.18 Local occasional delicacies Dal baati Males (n=150) % Females (n=150) % Once a week 25.33 26.66 Twice a week 10 8.99 On week ends 32.66 26 Monthly once 45.33 44 Rarely 3.33 11.33 Table 4.18 of food DAL- BAATI showed maximum intake frequency of monthly once in both the subjects where in males it showed 45.33% and in female subjects it was 44 respectively. Consumption Frequency - Daal Baati 50 45 40 35 30 25 20 15 10 5 0 Males (n=150) Females (n=150) Once a week Twice a week On week Monthly Rarely ends once Percentage

101 SECOND PART OF THE STUDY As the study was carried out to estimate the glycemic index of foods listed from food frequency method, ten

100%	MATCHING BLOCK 23/24	SA	Supriya v.docx (D93456152)

subjects who were willing to participate in the study were

selected with normoglycemia (normal blood glucose level) and who fall under normal category of BMI as per the guidelines given by WHO for the population living in Asia, BMI of 23 kg/m 2 indicated acceptable. Healthy volunteers between 30 to 40 years of age having BMI in between the range of 19.1 and 22.9kg/m 2 were selected. Subjects not lying in this category were excluded from the study. As to carry out the findings of study on 10 healthy subjects, BMI was calculated and all healthy individuals were falling under the range of 19 -24.9 which is considered as normal range of BMI (WHO, 2008).

102 Ref. Food Glucose(50g) 250 200 150 100 50 0 o hour 1 hour 2 hour IAUC Tables 4.19- 4.34 showing tabulation and graphical representation of blood glucose screening for all 15 selected test food and reference food(constant –glucose) at 0 hour, 1 hour, 2 hour and its incremental area under curve (IAUC) 50 g glucose o hour 1 hour 2 hour IAUC Subject 1 98

109 87 201 Subject 2 99 124 97 226 Subject 3 88 110 88 198 Subject 4 79 93 91 178 Subject 5 84 106 88 192 Subject 6 78 99 84 180 Subject7 80 112 108 206 Subject 8 103 120 111 227 Subject 9 90 106 101 201.5 Subject 10 91 103 97 197 Mean IAUC OF 50 G GLUCOSE C OF 50g GLUCOSE 200.6

103 Test food POHA 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC OF POHA o hour 1 hour 2 hour IAUC Table 4.20 for test food POHA POHA o hour 1 hour 2 hour IAUC Subject 1 86 116 140 229 Subject 2 80 104 125 206.5 Subject 3 94 112 110 214 Subject 4 99 120 126 232.5 Subject 5 89 97 117 200 Subject 6 91 103 106 201.5 Subject 7 98 110 107 212.5 Subject 8 93 120 126 229.5 Subject 9 89 113 121 218 Subject 10 100 119 130 234 MEAN IAUC OF POHA 217.75

104 Test food upma 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject7 Subject Subject Subject MEAN 1 2 3 4 5 6 8 9 10 IAUC OF UPMA o hour 1 hour 2 hour IAUC Table 4.21 for test food UPMA UPMA o hour 1 hour 2 hour IAUC Subject 1 78 130 110 224 Subject 2 88 121 106 218 Subject 3 80 102 98 191 Subject 4 84 94 96 184 Subject 5 92 106 97 200.5 Subject 6 96 116 110 219 Subject7 89 109 97 202 Subject 8 98 120 111 224 Subject 9 83 117 110 213.5 Subject 10 86 121 101 214.5 MEAN IAUC OF UPMA 209.05

105 Test food BESAN KA PARATHA 250 200 150 100 50 0 o hour 1 hour 2 hour IAUC Table 4.22 for test food BESAN KA PARATHA BESAN KA PARATHA o hour 1 hour 2 hour IAUC Subject 1 80 117 112 213 Subject 2 78 106 102 196 Subject 3 84 96 93 184.5 Subject 4 88 98 86 185 Subject 5 74 86 81 163.5 Subject 6 89 92 80 176.5 Subject 7 79 86 81 166 Subject 8 82 93 87 177.5 Subject 9 81 89 83 171 Subject 10 96 102 99 199.5 MEAN IAUC OF BESAN KA PARATHA 164.74

106 Test Food BESAN CHEELA 300 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC FOR BESAN CHEELA o hour 1 hour 2 hour IAUC Table 4.23 for BESAN CHEELA BESAN CHEELA o hour 1 hour 2 hour IAUC Subject 1 89 133 120 237.5 Subject 2 88 124 109 222.5 Subject 3 94 119 106 219 Subject 4 91 124 118 228.5 Subject 5 87 130 121 234 Subject 6 89 128 116 230.5 Subject 7 96 118 104 218 Subject 8 81 129 120 229.5 Subject 9 79 113 110 207.5 Subject 10 100 131 124 243 MEAN IAUC FOR BESAN CHEELA 227

107 Table 4.24 for test food RAAB 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC OF RAAB o hour 1 hour 2 hour IAUC Table 4.24 for test food RAAB RAAB o hour 1 hour 2 hour IAUC Subject 1 78 84 81 163.5 Subject 2 88 92 91 181.5 Subject 3 90 96 94 188 Subject 4 96 99 93 193.5 Subject 5 100 105 98 204 Subject 6 80 86 85 168.5 Subject 7 98 106 101 205.5 Subject 8 90 98 92 189 Subject 9 79 88 83 169 Subject 10 83 96 91 183 MEAN IAUC OF RAAB 184.5

108 Test food PATOLIYA 250 200 150 100 50 0 o hour 1 hour 2 hour IAUC Table 4.25 for test food PATOLIYA PATOLIYA o hour 1 hour 2 hour IAUC Subject 1 80 87 84 169 Subject 2 72 88 83 165 Subject 3 81 94 88 178.5 Subject 4 86 91 89 178.5 Subject 5 97 100 94 195.5 Subject 6 93 99 95 193 Subject 7 89 93 90 182.5 Subject 8 84 94 92 182 Subject 9 81 89 87 173 Subject 10 97 100 94 195.5 MEAN IAUC OF PATOLIYA 181.2

109 Test food GATTE KI SABJI 300 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC FOR GATTE KI SABJI o hour 1 hour 2 hour IAUC Table 4.26 for test food GATTE KI SABJI GATTE KI SABJI o hour 1 hour 2 hour IAUC Subject 1 88 133 122 238 Subject 2 86 137 119 239.5 Subject 3 79 129 117 227 Subject 4 84 109 105 203.5 Subject 5 96 119 110 222 Subject 6 89 124 116 226.5 Subject 7 87 130 116 231.5 Subject 8 99 128 120 237.5 Subject 9 98 117 105 218.5 Subject 10 84 109 101 201.5 MEAN IAUC FOR GATTE KI SABJI 224.5

110 Test food PITTOR KI SABJI 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IUAC FOR PITTOR KI SABJI o hour 1 hour 2 hour IAUC Table 4.27 for test food PITTOR KI SABJI PITTOR KI SABJI o hour 1 hour 2 hour IAUC Subject 1 87 128 122 232.5 Subject 2 83 111 107 206 Subject 3 94 120 108 221 Subject 4 89 116 104 212.5 Subject 5 93 119 107 219 Subject 6 91 113 110 213.5 Subject 7 97 127 121 236 Subject 8 89 126 113 227 Subject 9 81 119 111 215 Subject 10 79 114 110 224 MEAN IUAC FOR PITTOR KI SABJI 220.6

111 Test food PAPAD KI SABJI 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC FOR PAPAD KI SABJI o hour 1 hour 2 hour IAUC Table 4.28 for test food PAPAD KI SABJI PAPAD KI SABJI o hour 1 hour 2 hour IAUC Subject 1 84 89 85 173.5 Subject 2 88 86 83 171.1 Subject 3 96 99 94 194 Subject 4 92 99 96 193 Subject 5 81 86 85 169 Subject 6 79 84 83 165 Subject 7 97 103 100 201.5 Subject 8 83 91 89 177 Subject 9 80 92 84 174 Subject 10 94 101 99 197.5 MEAN IAUC FOR PAPAD KI SABJI 181.46

112 Test food BADI KI SABJI 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC FOR BADIKI SABJI o hour 1 hour 2 hour IAUC Table 4.29 for test food BADI KI SABJI BADI KI SABJI o hour 1 hour 2 hour IAUC Subject 1 81 85 84 167.5 Subject 2 79 83 80 162.5 Subject 3 80 89

83 170.5 Subject 4 90 96 94 188 Subject 5 75 81 80 158.5 Subject 6 82 88 86 172 Subject 7 90 98 96 191 Subject 8 87 96 89 184 Subject 9 79 87 86 169.5 Subject 10 89 98 94 189.5 MEAN IAUC FOR BADIKI SABJI 175.3

113 Test food KABULI 300 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC FOR KABULI o hour 1 hour 2 hour IAUC Table 4.30 for test food KABULI KABULI o hour 1 hour 2 hour IAUC Subject 1 90 124 80 209 Subject 2 98 134 114 240 Subject 3 96 123 111 226.5 Subject 4 94 119 104 218 Subject 5 89 131 101 226 Subject 6 83 123 107 218 Subject 7 91 126 110 226.5 Subject 8 87 133 121 237 Subject 9 93 120 109 221 Subject 10 97 129 106 230.5 MEAN IAUC FOR KABULI 225.2

114 Test food DAL BATI 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC FOR DAL BATI o hour 1 hour 2 hour IAUC Table 4.31 for test food DAL BATI DAL BATI o hour 1 hour 2 hour IAUC Subject 1 78 133 101 22.5 Subject 2 86 129 109 226.5 Subject 3 76 120 113 214.5 Subject 4 88 119 104 215 Subject 5 81 124 106 218 Subject 6 79 120 108 213.5 Subject 7 89 123 101 218 Subject 8 93 127 99 223 Subject 9 84 119 103 211.5 Subject 10 90 110 98 204 MEAN IAUC FOR DAL BATI 216.5

115 Test food MIRCHIWADA 250 200 150 100 50 0 o hour 1 hour 2 hour IAUC Table 4.32 for test food MIRCHIWADA MIRCHIWADA o hour 1 hour 2 hour IAUC Subject 1 86 104 117 205 Subject 2 90 116 109 215.5 Subject 3 96 126 114 231 Subject 4 89 109 106 206.5 Subject 5 93 107 101 204 Subject 6 88 99 96 191 Subject 7 86 101 94 191 Subject 8 92 107 100 203 Subject 9 97 119 106 220 Subject 10 88 119 104 214.5 MEAN IAUC FOR MIRCHIWADA 208.15

116 Test food KACHORI 250 200 150 100 50 0 o hour 1 hour 2 hour IAUC Table 4.33 for test food KACHORI KACHORI o hour 1 hour 2 hour IAUC Subject 1 94 123 127 233.5 Subject 2 91 118 121 224 Subject 3 98 116 113 221.5 Subject 4 89 120 109 219 Subject 5 97 124 120 232.5 Subject 6 86 119 112 218 Subject 7 94 108 104 207 Subject 8 98 118 126 230 Subject 9 100 126 120 236 Subject 10 93 113 109 214 MEAN IAUC FOR KACHORI 223.5

117 Test food SAMOSA 250 200 150 100 50 0 Subject Subject Subject Subject Subject Subject Subject Subject Subject Subject MEAN 1 2 3 4 5 6 7 8 9 10 IAUC FOR SAMOSA o hour 1 hour 2 hour IAUC Table 4.34 for test food SAMOSA SAMOSA o hour 1 hour 2 hour IAUC Subject 1 98 126 116 233 Subject 2 88 118 104 214 Subject 3 87 104 99 197 Subject 4 93 113 104 211 Subject 5 90 115 109 214 Subject 6 88 120 111 219.5 Subject 7 96 123 116 229 Subject 8 94 121 107 221.5 Subject 9 99 129 117 231 Subject 10 89 113 106 210 MEAN IAUC FOR SAMOSA 199.6

118 CALCULATED GLYCEMIC INDEX FOR 15 TEST FOOD TAKEN 250 200 150 100 50 0 Mean IAUC G.I. TABLE 4.35 SHOWING CALCULATED GLYCEMIC INDEX FOR 15 TEST FOOD TAKEN Ref. food Mean IAUC Ref. food 50 g Glucose 200.6 POHA 217.75 108.54 UPMA 209.05 104.21 BESAN KA PARATHA 164.74 82.12 BESAN KA CHEELA 227 113.1 RAAB 184.5 91 PATOLIYA 181.2 90.35 GATTE KI SABJI 224.5 111.9 PITTOR KI SABJI 220.6 109.9 PAPAD KI SABJI 181.4 90.4 BADI KI SABJI 175.3 87.3 KABULI 225.2 112.28 DAL BATI 216.6 108 MIRCHIWADA 208.15 103.7 KACHORI 223.5 111.4 SAMOSA 199.6 99.5

119 G.I CLASSIFICATION TABLE Classification of GI on the basis of result findings Reference : American Journal Of Clinical Nutrition (July 2002) High GI foods (Rank 100+) Moderately high GI foods (Rank 80-99) Low GI foods (Rank >80) POHA – 108.5 BESAN PARATHA – 82.12 UPMA – 104.2 SAMOSA – 99.5 KACHORI – 111.4 RAAB – 91 MIRCHIWADA – 103.7 BADI KI SABJI – 87.3 BESAN CHEELA – 113.1 PATOLIYA – 90.3 KHICHDI – 112.2 PAPAD KI SABJI – 90.4 PITTOR KI SABJI – 109.9 DAL BATI - 108 GATTE KI SABJI – 111.9

120 Statistical analysis Statistical analysis of selected test foods and calculation of t - test of food is given below:- Table 4.36- 4.51 showing t – TEST Calculations and results Table 4.36 The above table no. 4.36 for reference food glucose (50 g) shows t – value for 0-1 hour (4.75) which is statistically highly significant. At 0-2 hour t- value is (1.53) which is not significant and at 1-2 hour t- value is 3.15 which is highly significant. The above statistical result shows there was peak rise in glucose level at 0-1 hour but post prandial glucose dropped to normal glucose level in testing subjects who were non diabetic. REF. FOOD N MEAN STANDARD DEVIATION 't' 0 HOUR 1 HOUR 10 10 89.0000 108.2000 8.8819 9.1869 4.75 ** 0 HOUR 2 HOUR 10 10 89.0000 95.2000 8.8819 9.2352 1.53 NS 1 HOUR 2 HOUR 10 10 108.2000 95.2000 9.1869 9.2352 3.156 **

121 Table 4.37 POHA N MEAN STANDARD DEVIATION 't' 0 HOUR 1 HOUR 10 10 91.9000 111.4000 6.2619 7.9190 6.10 ** 0 HOUR 2 HOUR 10 10 91.9000 120.8000 6.2619 10.8812 7.28 ** 1 HOUR 2 HOUR 10 10 111.4000 120.8000 7.9190 10.8812 2.20 * The t-value for 0-1 hour is (6.10) , 0-2 hour(7.28) and 1-2(2.20) hour were highly significant and significant respectively. Hence, test food poha shows peak rise in glucose levels post prandial results.

122 Table no. 4.38 UPMA N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 87.4000 113.6000 6.5524 10.7207 6.59 ** 0 HOUR 2 HOUR 10 10 87.4000 103.6000 6.5524 6.3805 5.60 ** 1 HOUR 2 HOUR 10 10 113.6000 103.6000 10.7207 6.3805 2.53 * The t-value for 0-1 hour is (6.59) , 0-2 hour(5.60) and 1-2 hour (2.53) were highly significant and significant respectively. Hence, test food upma shows peak rise in glucose levels post prandial results

123 Table 4.39 BESAN KA PARATHA N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 83.1000 96.5000 6.3849 9.7325 3.64 ** 0 HOUR 2 HOUR 10 10 83.1000 90.4000 6.3849 10.8136 1.83 NS 1 HOUR 2 HOUR 10 10 96.5000 90.4000 9.7325 10.8136 1.32 NS The t- value for 0-1 hr is (3.64), 0-2 hour (1.83) and 1-2 hour (1.32) were highly significant and not significant respectively. Hence, test food besan parantha shows peak rise in glucose level at 0-1 hour but later drops down to normal level post prandial.

124 Table 4.40 BESAN CHEELA N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 89.4000 124.9000 6.3805 6.5056 12.32 ** 0 HOUR 2 HOUR 10 10 89.4000 114.8000 6.3805 6.9889 8.48 ** 1 HOUR 2 HOUR 10 10 124.9000 114.8000 6.5056 6.9889 3.34 **(t- value for test food besan cheela at 0-1 hour(12.32), 0-2hour(8.48) and 1-2 hour (3.34) shows that they are highly significant. Hence, it shows that besan cheela has peak rise in blood glucose level post prandial.

125 Table 4.41 RAAB N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 88.2000 95.0000 8.0664 7.5130 1.95 NS 0 HOUR 2 HOUR 10 10 88.2000 90.9000 8.0664 6.3500 0.83 NS 1 HOUR 2 HOUR 10 10 95.0000 90.9000 7.5130 6.3500 1.31 NS t- value for test food raab at 0-1 hour (1.95) , 0-2 hour(0.83) and 1-2 hour (1.31)shows that they are not significant. Hence , it shows that raab has no remarkable rise in post prandial glucose level.

126 Table 4.42 PATOLIYA N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 86.0000 93.5000 8.0691 4.8819 2.51 * 0 HOUR 2 HOUR 10 10 86.0000 89.6000 8.0691 4.1952 1.25 NS 1 HOUR 2 HOUR 10 10 93.5000 89.6000 4.8819 4.1952 1.91 NS t – value for test food patoliya at 0-1 hour (2.51), 0-2 hour(1.25) and 1-2 hour (1.91) shows significance at 0-1 hour and not significant for other two variables respectively. Hence , it shows that patoliya gives peak rise in blood glucose level in first hour but drops down to normal level post prandial.

127 Table 4.43 GATTE KI SAJI N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 89.0000 123.5000 6.6165 9.7079 9.28 ** 0 HOUR 2 HOUR 10 10 89.000 113.1000 6.6165 7.3098 7.73 ** 1 HOUR 2 HOUR 10 10 123.5000 113.1000 9.7097 7.3098 2.70 * T – value for test food gate ki sabji at 0-1 hour(9.28) , 0-2 hour (7.33) and 1-2 hour(2.70) shows high signifance and significance respectively. Hence it shows there is peak rise in blood glucose level post prandial

128 Table 4.44 PITTOR KI SAJI N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 88.3000 119.3000 5.8509 6.0378 11.66 ** 0 HOUR 2 HOUR 10 10 88.3000 111.3000 5.8509 5.9264 8.73 ** 1 HOUR 2 HOUR 10 10 119.3000 111.3000 6.0378 5.9264 2.99 ** t– value for test food pittor ki sabji at 0-1 hour (11.66) , 0-2 hour (8.73) and 1-2 hour (2.99) shows high significance. Hence, it gives peak rise in blood glucose at post prandial level.

129 Table 4.45 PAPAD KI SABJI N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 87.4000 93.0000 6.8993 6.9602 1.80 NS 0 HOUR 2 HOUR 10 10 87.4000 89.8000 6.8993 6.8118 0.78 NS 1 HOUR 2 HOUR 10 10 93.0000 89.9000 6.9602 6.8118 1.03 NS t- value for test food papad ki sabji at 0-1hour (1.80), 0-2 hour(0.78) and at 1-2 hour(1.03) shows no significance. Hence, no prominent increase in blood glucose at post prandiallevel.

130 Table 4.46 BADI KI SABJI N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 83.200 90.1000 5.2707 6.4023 2.61 * 0 HOUR 2 HOUR 10 10 83.2000 87.2000 5.3707 5.8462 1.59 NS 1 HOUR 2 HOUR 10 10 90.1000 87.2000 6.4023 5.8462 1.05 NS t- value for badi ki sabji at 0-1 hour(2.61), 0-2 (1,59) 1-2 (1.05) shows significance at 0-1 hour and no significance for other two variables respectively.Hence, there is no remarkable rise in blood glucose at post prandial.

131 Table 4.47 KABULI N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 91.8000 126.2000 4.7329 5.3083 15.29 ** 0 HOUR 2 HOUR 10 10 91.8000 106.3000 4.7329 10.7708 3.89 ** 1 HOUR 2 HOUR 10 10 126.2000 106.3000 5.7194 10.7708 5.24** t- value for test food kabuli at 0-1 hour(15.29) at 0-2 hour(3.89) at 1-2 hour (5.24) were highly significant. Hence, it shows peak rise in blood glucose level post prandial.

132 Table 4.48 DAL BATI N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 84.4000 122.4000 5.7194 6.3979 14.00 ** 0 HOUR 2 HOUR 10 10 84.4000 104.2000 5.7219 4.7796 8.40 ** 1 HOUR 2 HOUR 10 10 122.4000 104.2000 6.3979 4.7796 7.20 ** t- value for test food daal- baati at 0-1 hour(14.00) at 0-2 hour(8.40) at 1-2 hour (7.20) were highly significant. Hence, it shows peak rise in blood glucose level post prandial.

133 Table 4.49 MIRCHIWADA N MEAN STANDARD DEVIATION ‘t’ 0 HOUR 1 HOUR 10 10 90.5000 110.7000 3.8944 8.8575 6.60 ** 0 HOUR 2 HOUR 10 10 90.5000 104.7000 3.8944 7.3492 5.39 ** 1 HOUR 2 HOUR 10 10 110.7000 104.7000 8.8575 7.3492 1.64 NS t- value for test food mirchiwada at 0-1 hour(6.60) at 0-2 hour(5.39) at 1-2 hour (1.64) were highly

significant at first two variables but no significance was seen at 1-2 hours. Hence, it shows rise in blood glucose level post prandial.

134 Table 4.50 KACHORI N MEAN STANDARD DEVIATION 't' 0 HOUR 1 HOUR 10 10 94.0000 118.5000 4.4222 5.3385 11.17 ** 0 HOUR 2 HOUR 10 10 94.0000 116.1000 4.4222 7.7810 7.80 ** 1 HOUR 2 HOUR 10 10 118.5000 116.1000 5.3385 7.7810 0.80 NS t- value for test food kachori at 0-1 hour(11.17) at 0-2 hour(7.80) at 1-2 hour (0.80) were highly significant at first two variables but no significance was seen at 1-2 hours. Hence, it shows rise in blood glucose level post prandial.

135 Table 4.51 SAMOSA N MEAN STANDARD DEVIATION 't' 0 HOUR 1 HOUR 10 10 92.2000 118.2000 4.4171 7.2847 9.65 ** 0 HOUR 2 HOUR 10 10 92.2000 108.9000 4.4171 6.0452 7.05 ** 1 HOUR 2 HOUR 10 10 118.2000 108.9000 7.2847 6.0452 3.10 ** t- value for test food samosa at 0-1 hour (9.65) at 0-2 hour (7.05) and at 1-2 hour (3.10) were highly significant . Hence it shows peak rise in glucose level post prandial. NOTE:- * denotes significance at 0.05 level. ** denotes significance at0.01 level.

136 Table 4.52, 4.53 and 4.54 showing the pearson's coefficient of correlation of test goods at o hour, 1 hour and 2 hour blood glucose screening. Table 4.52 showing correlation among the variable (reference food and test foods) at 0 hour of blood glucose screen Poha Upma Besan paratha Besan cheela Raab Patoliya Gatte ki sabji Pittor ki sabji Papad ki sabji Badi ki sabji Kabuli Dal bati Mirchiwada Kachori Samosa Ref. food -.493 -.053 -.202 -.369 -.349 -.557 .270 -.481 -.176 -.170 .217 .212 .135 .422 .159 Poha .028 .614 .541 .311 .600 -.276 .216 .562 .774 ** .022 .389 -.166 -.056 .001 Upma -.041 -.262 .257 .391 .515 .220 -.385 .102 -.613 .419 -.087 -.199 -.260 Besan paratha .493 -.374 .364 -.434 -.382 .284 .576 .129 .200 -.235 -.433 -.296 Besan cheela .195 .378 -.816 ** .154 .791 ** .458 .378 -.002 -.519 -.378 -.421 Raab .242 -.046 .625 .398 .168 .077 .282 .021 .084 =.182 Patoliya .102 .195 -.026 .223 -.381 .104 -.212 -.156 -.203 Gatte ki sabji -.115 -.767 ** -.272 -.536 .261 .306 .433 .483 Pittor ki sabji .203 .030 -.439 -.263 -.090 -.017 -.093 Papad ki sabji .567 .636 * .226 -.223 -.040 -.207 Badi ki sabji .063 .692 * -.531 -.304 .167 Kabuli .143 .187 .170 -.179 Dal bati -.215 .013 .199 Mirchiwada .684* -.071 Kachori .375 Samosa The above table 4.52 shows significance and correlation among two variables at 0-1 hour. Significance at .01 level (**) Very high significance and negative correlation among test food (gate ki sabji and besan ka cheela -.816). High significance and positive correlation among (papad ki sabji and besan ka cheela.791). High significance and negative correlation among(papad ki sabji and gate ki sabji -.767),High significance and positive correlation among (badi ki sabji and poha .774). Significance at .05 level(*) High significance and positive correlation among(kabuli and papad ki sabji .636).High significance and positive correlation among (dal baati and badi ki sabji .692). High significance and positive correlation among (kachori and mirchiwada .684).

137 Table 4.53 showing correlation among the variable (reference food and test foods) at 1 hour of blood glucose screen Poha Upma Besan paratha Besan cheela Raab Patoliya Gatte ki sabji Pittor ki sabji Papad ki sabji Badi ki sabji Kabuli Dal bati Mirchiwada Kachori Samosa Ref. food -.123 .467 .142 -.052 .053 -.342 .777 ** .245 -.210 -.195 .735 * .581 .144 -.186 .169 Poha .075 .346 .012 -.103 -.296 -.301 .318 .591 .707 * -.274 -.207 .213 -.176 .020 Upma .525 .388 -.604 -.217 .407 .158 -.411 -.203 .390 .361 -.122 .115 .592 Besan paratha .478 -.579 -.490 .269 -.010 -.123 -.169 .052 .366 .119 .121 .020 Besan cheela -.107 .352 -.024 .004 -.361 -.085 .435 .207 -.384 .088 -.096 Raab .388 -.200 .176 .478 .374 .306 -.192 -.055 -.468 -.382 Patoliya -.444 -.273 .026 .180 .219 -.583. -.109 -.245 -.431 Gatte ki sabji .340 -.350 -.380 .382 .794 ** -.163 -.136 .209 Pittor ki sabji .233 .200 -.044 .471 -.326 -.088 .370 Papad ki sabji .785 ** -.301 -.529 .308 -.655 * -.329 Badi ki sabji -.131 -.497 -.060 -.688 * -.115 Kabuli .305 -.029 -.216 -.059 Dal bati -.390 .283 .399 Mirchiwada .048 -.485 Kachori .297 Samosa Significance at .01 level (**) Highly significant and positive correlation among Gate ki sabji and ref food (.777) High significance and positive correlation among Badi ki sabji and papad ki sabji (.785) High significance andpositive correlation among dal baati and gate ki sabji (.794) Significance at .05 level(*) High significant and positive correlation among Badi ki sabji and poha (.707) High significance and positive correlation among Kabuli and reference food (.735) High significance and negative correlation among kachori and papad ki sabji (- .655) High significance and negative correlation among kachori and badi ki sabji(-688)

138 Table 4.54 showing correlation among the variable (reference food and test foods) at 2 hour of blood glucose screen Poha Upma Besan paratha Besan cheela Raab Patoliya Gatte ki sabji Pittor ki sabji Papad ki sabji Badi ki sabji Kabuli Dal bati Mirchiwada Kachori Samosa Ref. food .025 .122 -.193 -.221 .315 -.024 .018 .307 .322 .466 .582 -.565 -.403 .001 .205 Poha .306 .748 * .593 -.460 -.416 -.051 .144 -.115 -.027 -.476 -.514 .584 .559 .055 Upma .238 .165 -.796 ** -.189 .385 .300 -.674 -.287 -.027 -.194 .099 .666 * .396 Besan paratha .200 -.418 -.616 .296 .260 -.082 -.237 -.497 -.092 .783 ** .411 -.128 Besan cheela -.251 .440 -.287 -.130 -.099 .055 -.356 -.501 .014 .307 -.032 Raab .315 -.076 -.156 .585 .267 .424 .074 -.448 -.501 -.342 Patoliya -.372 -.200 .238 .321 .244 -.206 -.714 * -.380 -.054 Gatte ki sabji .471 -.361 -.411 -.055 .257 .168 .459 .046 Pittor ki sabji .098 .235 =.402 -.497 -.028 .129 .711 * Papad ki sabji .087 ** .163 -.323 -.186 -.740 * -.235 Badi ki sabji .149 -.630 -.446 -.660 * .148 Kabuli .143 -.479 -.209 -.406 Dal bati .268 -.057 -.495 Mirchiwada .449 -.263

Kachori .137 Samosa Significance at .01 level (**) High significance and negative correlation among raab and upma (-.796); Very high significance and positive correlation among badi ki sabji and papad ki sabji (.807) High significance and positive correlation among mirchiwada and besan parantha (.783) Significance at .05 level (*) High significance and positive correlation among besan parantha and poha (.748); High significance and negative correlation among mirchiwada and patoliya (-.714) High significance and positive correlation among kachori and upma (.666); High significance and negative correlation among kachori and papad ki sabji (-.740) High significance and negative correlation among kachori and badi ki sabji (-.660); High significance and positive correlation among samosa and pittor ki sabji (.711) Significance of degree of correlation ±.00 to ± .20 = Very Low ± .21 to ± .40 = Low ± .41 to ± .60 = Average ± .61 to ± .80 = High ± .81 to 1.00 = Very High

Chapter-5 CONCLUSION AND RECOMMENDATIONS

140 T Chapter – 5 CONCLUSION AND RECOMMENDATIONS he present study was carried out at THE ENDO CLINIC of Jodhpur city, Rajasthan to estimate glycemic index of local foods consumed by diabetic patients of Jodhpur city and its impact on their blood glucose level. Accordingly, a total 310 subjects were studied out of which 150 males and 150 females aged between 35-45 years were selected .The data includes general information on the basis of age, education, eating habits. The more emphasis was given over the consumption pattern of local foods on the basis of their daily meal pattern so as to list out the frequently consumed food items General information was collected on the basis of table no.4.1, 4.2 and 4.3 information regarding age, education and eating habits are shown in percentage with respective graphical representation. The results showedthat 41%

males and 24% females

of age.On the basis of percentagemean of subjects education, both the subjects were under the category of literate. None of them was under illiterate category.Percentage distribution on the basis of eating habits was calculated, where both the subjects were under vegetarian category. As per the need of the study, two different groups of subjects were selected .In the first part of study, the criteria was to collect information and data regarding food consumption pattern and frequency of local foods among diabetic subjects so that the pattern of consumption and most frequently consumed foods can be listed out. From the information collected by the diabetic subjects foods were categorized on the basis of food frequency questionnaire.

141 The second part of the study, 10 healthy and non -diabetic subjects were selected for testing the and estimating Glycemicindex of 15 highly consumed foods and on the basis of glucose readings glycemic index was calculated and foods were classified on the basis of classification table. The results and statistical analysis showed that all the foods were under the range of very high and moderately high GI list, which shows that higher the ranking of food's GI faster it will increase the glucose levels. The present study concludes that the local foods consumed by diabetic patients of jodhpur city are high in their Glycemic index ranking. As the results showed, higher The GI ,higher will be the incremental peak rise in blood sugar levels. When these foods will be consumed by type 2 diabetic patients, there will be risein their blood glucose level as high glycemic index and deficit in the insulin will show peak rise than the normal range. Therefore, diabetic patients consuming high GI foods will be at risk of abnormal rise in the blood sugar after consumption of these foods. Foods like besancheela, gatte, pittor, mirchiwadapoha ,upma have ranking of GI obove 100 on the scale(more than 100- very high) which is considered as very high in ranking. The results will be a helping tool in management of diabetes as by portion control ,intake pattern, reduction in frequency and by understanding the concept of glycemic index ,dabetes can be managed and correct dietary guidelines can help diabetics to select the food wisely.

Recommendations:- ❖ Further studies are needed to assess glycemic index of staplefoods among rural sections of community. ❖ Further research can be done on actions of glycemic index of ready to eat food (packed food) among Type 1 ,LADA and MODY diagnosed population. ❖ Further research can be done onestimating (Meal) glycemic index as it has become need of the present era to assess the glycemic index of complete meal. ❖ Further studies on coping strategies and implementation of glycemic index values in meal planning by the nutritionist can be a great step in managing diabetes. ❖ Further studies on reduction of glycemic index ranking of locally consumed foods by diabetic patients of Jodhpur can help in diabetes management and can delay the rise in blood glucose level.

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1/24	SUBMITTED TEXT	79 WORDS	73%	MATCHING TEXT	79 WORDS

the management of diabetes mellitus, diet has been recognized as a cornerstone of the therapy. There is a considerable evidence to show that good control of blood glucose prevents or delay the debilitating complications of diabetes. The use of carbohydrate both in terms of quantity as well as quality in diabetes meal planning has always been a key therapeutic issue. The amount of total carbohydrate recommended for diabetic diet has varied significantly over the years.	the management of diabetes mellitus, diet has been recognized as a cornerstone of therapy. There is considerable evidence to show that better control of blood sugar prevents or delays the debilitating complications of diabetes 1 . The use of carbohydrate both in terms of quantity as well as quality in diabetic diet, has always been a key therapeutic issue 2 . The amount of total carbohydrate recommended for the diabetic diet has varied significantly over the years 3 .

W https://www.researchgate.net/publication/12366675_Glycemic_responses_to_cereal-based_Indian_food_ ...

3/24	SUBMITTED TEXT	17 WORDS	100%	MATCHING TEXT	17 WORDS

There are many traditional beliefs regarding the type of carbohydrate in the diabetic diet, which in	There are many traditional beliefs regarding the type of carbohydrate in the diabetic diet, which in

W https://www.researchgate.net/publication/12366675_Glycemic_responses_to_cereal-based_Indian_food_ ...

2/24	SUBMITTED TEXT	18 WORDS	91%	MATCHING TEXT	18 WORDS

recent years are questioned. According to traditional thoughts, simple sugars are rapidly digested and absorbed and therefore	recent years are questioned. According to traditional thought, simple sugars are rapidly digested and absorbed and therefore

W https://www.researchgate.net/publication/12366675_Glycemic_responses_to_cereal-based_Indian_food_ ...

4/24	SUBMITTED TEXT	21 WORDS	80%	MATCHING TEXT	21 WORDS

is defined as the area under the glucose response curve after consumption of 50 g carbohydrate from a test food	is defined as the area formed under the glycemic response curve, after the consumption of 50g of available carbohydrate from a test food,

W https://www.researchgate.net/publication/8891268_Effect_of_blood_sampling_schedule_and_method_of_ ...

5/24	SUBMITTED TEXT	23 WORDS	100% MATCHING TEXT	23 WORDS

Many factors together, including carbohydrate type, fiber, protein, fat, food form and method of preparation, determine the GI of a particular food (

Many factors together, including carbohydrate type, fiber, protein, fat, food form and method of preparation, determine the GI of a particular food.

W http://www.suaire.sua.ac.tz/bitstream/handle/123456789/1469/CAROLYNE%20CHARLES%20RUHEMBE.pdf?sequ ...

6/24	SUBMITTED TEXT	16 WORDS	85% MATCHING TEXT	16 WORDS

Analysis of Data: Data was statistically analyzed as per the objectives of the study.

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22/24	SUBMITTED TEXT	74 WORDS	72% MATCHING TEXT	74 WORDS

Standard Deviation √ ∑( )= mean of observations N = number of observations 79 Standard Error √ σ, = standard deviation N = number of observation T – test

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7/24	SUBMITTED TEXT	24 WORDS	62% MATCHINGTEXT	24 WORDS

were under the age group of 35-40 years whereas 52% males and 76% females were under the age group of 40-45 years

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8/24	SUBMITTED TEXT	41 WORDS	52% MATCHING TEXT	41 WORDS

Percentage distribution of subjects on the basis of Education 100 90 80 70 60 50 40 30 20 10 0 Literate IlliterateMalesubjectsFemalesubjectsPercentage85 Table 4.3 Percentage distribution of subjects on the basis of

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9/24	SUBMITTED TEXT	18 WORDS	100% MATCHING TEXT	18 WORDS

Male (n=150) % Female (n= 150) % Once a week 40 25.33
Twice a week 32.66 20

SA Sona thesis.doc (D21444835)

12/24	SUBMITTED TEXT	17 WORDS	100% MATCHING TEXT	17 WORDS

Male (n=150) % Female (n=150) % Once a week 36 44.66
Twice a week 30.66 22.66

SA Sona thesis.doc (D21444835)

10/24	SUBMITTED TEXT	27 WORDS	62% MATCHING TEXT	27 WORDS

frequency - Patoliya 40 35 30 25 20 15 10 5 0 Male
(n=150) Females (n=150) Once a week Twice a week On
week Monthly Rarely

SA Sona thesis.doc (D21444835)

11/24	SUBMITTED TEXT	17 WORDS	100% MATCHING TEXT	17 WORDS

Male (n=150) % Female (n=150) % Once a week 25.33
29.33 Twice a week 27.33 33.33

SA Sona thesis.doc (D21444835)

15/24	SUBMITTED TEXT	13 WORDS	83% MATCHING TEXT	13 WORDS

Male (n=150) Female (n=150) Once a Twice a On week
Monthly Rarely

SA Sona thesis.doc (D21444835)

13/24	SUBMITTED TEXT	17 WORDS	100% MATCHING TEXT	17 WORDS

Male (n=150) % Female (n=150) % Once a week 36 32.66
Twice a week 25.33 24.66

SA Sona thesis.doc (D21444835)

14/24	SUBMITTED TEXT	17 WORDS	100%	MATCHING TEXT	17 WORDS

Male (n=150) % Female (n=150) % Once a week 48.66 40.66 Twice a week 26 22

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16/24	SUBMITTED TEXT	17 WORDS	100% MATCHING TEXT	17 WORDS

Male (n=150) % Female (n=150) % Once a week 46 34.66 Twice a week 22.66 11.33

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17/24	SUBMITTED TEXT	15 WORDS	78% MATCHING TEXT	15 WORDS

Male (n=150) Female (n=150) Once a week Twice a week On week Monthly Rarely

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18/24	SUBMITTED TEXT	18 WORDS	100% MATCHING TEXT	18 WORDS

Male (n=150) % Female (n=150) % Once a week 12 14 Twice a week 8.99 6.66

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19/24	SUBMITTED TEXT	17 WORDS	78% MATCHING TEXT	17 WORDS

Male (n=150) Female (n=150) 10 0 Once a week Twice a week On week Monthly Rarely

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21/24	SUBMITTED TEXT	18 WORDS	100% MATCHING TEXT	18 WORDS

Male (n=150) % Female (n=150) % Once a week 32.66 37.33 Twice a week 8.99 12

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Curiginal

20/24	SUBMITTED TEXT	18 WORDS	78% MATCHING TEXT	18 WORDS

Male (n=150) Female (n=150) 10 0 Once a week Twice a week On week Monthly Rarely

SA Sona thesis.doc (D21444835)

23/24	SUBMITTED TEXT	11 WORDS	100% MATCHING TEXT	11 WORDS

subjects who were willing to participate in the study were

SA Supriya v.docx (D93456152)

24/24	SUBMITTED TEXT	23 WORDS	62% MATCHING TEXT	23 WORDS

were under the age group of 35-40 years whereas 52% males and 76% females were under the age group of 40-45 years

SA C VD Methodology and Results Discussion.docx (D30208825)

COURSE WORK CERTIFICATE

JAI NARAIN VYAS UNIVERSITY, JODHPUR

FACULTY OF SCIENCE

CERTIFICATE

Date : 8/10/2013 No. 10

This is to certify that Mr./Ms. Khushboo Vyas

_____ in the Department of Home Science

Jai Narain Vyas University, Jodhpur has qualified the course work organized by the university during Session 2013-14.

This Certificate is issued in accordance with the provisions of UGC (Minimum Standards and Procedure for Award of M.Phil/Ph.D. Degree) Regulations 2009 notified in the Gazette of India on 11th July 2009.

Professor & Head
Department of Home Science
Jai Narain Vyas University
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HEAD

Dean
Faculty of Science
J.N.V. University
JODHPUR

DEAN

PRE Ph.D PRESENTATION CERTIFICATE

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No. J.N.N.U. /Sc. /P.G. /H. Sc. /19/ 3449

Date 24/10/2019

TO WHOM IT MY CONCERN

This is to certify that Ms. Khushboo Vyas, Research Scholar of the Department of Home Science, J. N. V. University, Jodhpur has delivered her **Pre. Ph. D Presentation** on the topic **"ESTIMATION OF GLYCEMIC INDEX OF LOCAL FOODS CONSUMED BY DIABETIC PATIENTS OF JODHPUR CITY AND ITS IMPACT ON THEIR BLOOD GLUCOSE LEVEL"** in the Department of Home Science on 24th Oct. 2019. Her presentation was satisfactory at 11.30 P. M.

Dr. Ashok Purohit
Professor & Head

Professor & Head
Department of Home Science
Jai Narain Vyas University
Jodhpur