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Prevention and Awareness of Diet in Diabetes Conducted In Hyderabad

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Abstract: Diabetes have been known for centuries as a disease related to sweetness persons with diabetes have excess of sugar in their blood and urine. We can control diabetes with proper diet control and medication. Maintainence of blood glucose and HbA1c within normal limits helps to prevent and limit progression of diabetic compilation. Greens are the important source of food for people to eat. Due to their high fiber content. The present study was conducted to develop a fibre rich product for all diabetic people. The main aim of study was to aware people about diabetes. And a fibre rich product was also developed for diabetes and a sensory evaluation was done on it. Chapattis are on of the easy items to prepare which can be taken by all age groups it is easy to make. The innovative nutritious product was standardised and 3 variations were prepared using different combinations of wheat flour fenugreek greens sesame seeds. Wheat flour used primarily from 300gm to 150gm. This fibre and low glycemic index product was prepared to meet the fibre needs of the body. The awareness programme was done in near by diabetic clinic. Where the patients were from different cast and backgrounds. Pamphlets were distributed to people as a part of awareness programme. Which was carried out to great extend and the product developed was highly accepted.

Keywords- ***Diabetes, HbA1c, standardization, low glycemic index, fibre***

I. INTRODUCTION

Diabetes Mellitus is chronic metabolic disorder that prevents the body to utilise glucose completely or partially. It is characterised by raised glucose concentration in the blood alterations in carbohydrates, protein and fat metabolism. This can be due to failure in formation of insulin or liberation of action since insulin is produced by beta cells of islets of Langerhans any receeding in thw number of function cells will decrease the amount of insulin that can be synthesise.

A. Prevelance

Diabetes is on increase in in India. The multicentre ICMR study showed a prevelance of 2.5 percent in the urban and 1.8 percent in the rural population above the age of 15 years the prevelance is 2.8 percent among those who are still engaged in strenuous physical activity compared to 48.3 percent living a near sedentary lifestyle.

B. Types

1) *Type1: In* insulin dependent diabetes mellitus also known as juvenile onset diabetes patient depend upon insulin. There is usually sudden onset and occur in younger age groups and there is an inability of pancreas to produce insulin. These may be caused by virus or due to autoimmunity. The child is usually underweight. Acidosis is fairly common.
2) *Type 2:* non-insulin dependent diabetes mellitus. Non insulin dependent form and developes slowly and is usually mild and more stable. Insulin may be produced by pancreas but action is impaired. This forms occur mainly in adults and the person is usually overweight. Acidosis is in frequent. The majority of patients improve with weight loss and are maintained on diet therapy. Women who had larged babies or large families are also prone to develop this type of diabetes later in life.

C. Malnutrition related diabetes (MRDM)

Recently,a third type of malnutrition related diabetes mellitus, MRDM called by WHO has been categorised as a separate entity. This type of diabetes is mainly seen in some tropical countries like India and occurs in young people between 15 to 30 years of age. People with MRDM are lean and undernourished in this type the pancreas fail to produce adequate insulin. As aresult this

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diabetics require insulin in contrast to type1 diabetes. These patients do not develop ketoacidosis when insulin injections are discontinued.

D. Aetiology

Pattern of inheritance and environmental factors differ in IDDM and NIDDM.

1) Iddm

a) Genetics: the inheritance of human IDDM is polygenic. It has been estimated that over 50 percent of the inheritability is contributed by the HLA class II genes(chromosome 6)

b) Infections: infection cause a non specific outpouring of catabolic hormones which antagonised insulin action and then may trigger the onset of disorder.

c) Acute stress: the normal gluose levels homeostasis in the body is achieved by a delicate interplay of various hormones. Body releases adrenaline, non adrenaline and cortisol hormones that raises blood glucose levels to provide quick source of energy for coping with stress in acute cases of stress blood glucose level may rise quitte profoundly and in extreme cases diabetic ketosis and comma may also occur. Physical injury , surgery, emotional distress sometimes preceed the first symtoms of diabetes. Like infection these causes a sudden increase in secretion of catabolic hormones which may precipitate the disorder.

d) Immunological factor: IDDM is a slow autoimmune disease. Associated with other autoimmune disorders. Hyper gycaemia accompanied by classical symptoms of diabetes occur only when 90 percent of insulin secreting cells are already destroyed.

2) Niddm

a) Life style: NIDDM is usually associated with people who are obese and who over eat. The majority middle aged overweight patients develop diabetes. Obesity probably acts as diabetogenic factor by increasing resistance to the action of insulin among those are genetically predisposed to develop NIDDM. Recently, resistin a cysteine a rich secretory protein has been implicated at the molecular link between obesity and type2 diabetes. High intake of refined grains, which have high GI combined with sedentary activity, could be main reasons for incidence of obesity, diabetes and CVD, epidemic in INDIA.

b) Age: NIDDM is principally disease of middle aged and elderly, half of all new cases of type2 diabetes occur among age group above 55.

c) Abdominal fat : people with high waist/hip ratio indiacting that fat is largely in abdominal cavity has a greater risk of diabetes than people with similar amount of fat peripherally. This probably relates to insulin insensitivity which is caused by a high flux of free fatty acids in portal circulation. Since intra abdominal fat cells can release fatty acids very rapidly.

d) Pregnancy: during normal pregnancy the level of plasma insulin raised by action of placental hormones thus placing a burden of insulin secreting cells of pancreatic islets. The pancreas may be unable to meet this demands in women genetically predisposed to develop both type of diabetes. The term gestational diabetes refers to hyper glycemia occurring for the first time during pregnancy. Long term studies show that some 80 percent women with gestational diabetes ultimately develop permanent clinical diabetes requiring treatment.

e) Insulin resistant: it is characteristic feature of Indians. Insulin resistance the inability of the body to control blood glucose with normal levels of insulin is associated with obesity and NIDDM.

E. Symtoms

1) Hyperglycemia: a deficient supply of functioning insulin effects the metabolism of carbohydrates fats proteins electrolyte and water and the consequences of impairments are complexed. When insulin is not being produced or is ineffective the formation of glycogen is decreased and the utilisation of glucose in the peripheral tissues is reduced.

2) Glycosuria: when blood glucose levels exceed the renal threshold (about increase 160-180 mg/100ml) glycosuria occurs.

3) Fluid and electrolyte imbalance: the loss of glucose in the urine represents a wastage of energy and entails an increased elimination of water and sodium.

4) Acidosis : wih deficiency of insulin lipogenesis decreases and lipolysis is greatly increased, this effects being of both immediate and long range consequences the fatty aids release from adipose tissue or available by adsorbtion from intestinal tract are oxidised by the liver to form ketone bodies including acetoacetic acid, beta hydroxyl glutaric acid are excreted in the urine. Being strong organic acids these ketones combine with base so that the alkaline reserve is depleted and acidosis results.

5) Fatigue and loss of weight: impaired utilization of carbohydrates results in a sense of fatigue and to compensatory mechanism operate to provide alternative metabolic substrate both lead to loss of body tissue and wasting may occur inspite of normal or even increase intake of food. This is added to any loss of weight resulting from loss of fluid.

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6) *Polyuria :* glycosuria occurs when the blood glucose levels is 180 mg/dl.
7) *Polydipsia and polyphagia :* polyuria leads to loss of water and electrolytes which results in thirst and polydipsia. Patient feels excess hunger as glucose is lost in urine.

F. DIAGNOSIS: several test are used in diagnosis of diabetes.

1) *Glycosuria* : the presence of an abnormal amount of sugar in urine regarded as evidence diabetes until proved.Urine is voided just before the meal.Breakfast or lunch is taken with usual helpings of carbohydrate rich foods such as bread, chapatti, rice, fruits and sweets.Two or three hours after the meal urine is voided and examined for sugar
2) *Ketonuria:* the amount of ketone bodies normally excreted by healthy persons are not detected by routine methods. High amounts excreted can be detected in the urine by nitroprusside reaction which is conveniently carried out using acetest tablet, ketostix papersticks.
3) *Random blood sugar:* In many cases, diabetes can be diagnosed by a single blood estimation. Which may be used as confirmatory test when a classical symtoms suggest the diagnosis.glucose tolenterence test:WHO recommends for the test that 75gm to be used as glucose load for adults and 1.75gm per kg body weight for children with maximum of 75gm. All medications should be stopped 3 days before the test.impaired glucose tolerence test: when the glycemic response after administration of a 75g of oral glucose load is intermediate between normal and diabetic, that condition is described as impaired glucose tolerance. Individuals with IGT are generally free from symptoms of diabetes however they have the potential to develop diabetes at later stage they should be more careful in their diet and avoid obesity.

G. Treatment: diabetes can be treated by diet alone or diet and hypoglycaemic drugs or diet plus insulin dependingon the type and severity of the condition.

1) clinical criteria:
Relief from symptoms
Reduction in obesity and maintenance if normal body weight depending upon height and built.
Presence of adequate energy and endurance for work performance.
2) Bio chemical criteria

Urine sugar testing
Urine should be tested for ketones in insulin dependent diabetes
24hrs urinary glucose excretion should be limited to 5% or less of daily carbohydrates intake. It is a useful test for assessing control of diabetes in children.

3) Blood glucose monitoring:

This helps In checking the effects of food activity and insulin on blood sugar. Blood glucose monitoring technology measure the glucose content of a blood sample by means of an electrical current produced in the test strip and sent to the meter for measurement.

4) management of diabetes:

Objectives
To improve blood glucose and lipid levels
To promote consistent day-to-day intake for people with insulin dependent diabetes and weight management for people with noninsulin dependent type.
Education

5) Diet and insulin

The philosophy of diet therapy for the juvenile diabetic is that while in a healthy child, the insulin secretion matches the food intake has to match the injected insulin. A child unlike an adult is still in the process off growth and development and is bound to have more activity and exercise.

H. Nutrition requirement

6) *Carbohydrates:* carbohydrates restriction impairs insulin sensitivity and reverse by high carb diet. High carb and high fibre diet improves insulin binding and increase in monocyte insulin receptor binding.
7) *Proteins:* A high diet in protein (20%) k.cal is good for the health for diabetes because it supplies the essential amino acids needed for tissue repair.

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8) *Fat:* low fat diet increases insulin binding and also reduces LDL and VLDL levels and reduce the incidence of atherosclerosis which is more common in diabetes. Fat content in the diet should be 15-25% of total calories and higher in poly unsaturated fatty acids.
9) *Vitamins & minerals:* vitamins supplements may be helpful to overcome oxidative stress and deficiency. Diets rich in vitamins particularly in vitamin c and e antioxidants in fruits and vegetables and in minerals specially magnesium and zinc are encouraged.
10) *Dietary fibre:* Dietary fibre and complex carbohydrates benefit type I and type II diabetes. Such diets lower
Insulin requirement
Increase peripheral tissue insulin sensitivity
Decrease serum cholesterol and triglycerides values
Aid in weight control and lower blood pressure

II. AIM&OBJECTIVES

A. AIM: To access nutritional status of the subjects by anthropometry.
B. OBJECTIVES:
C. To observe the awareness of diabetes.
D. to collect information for the cause of diabetes
E. find the level of awareness of diabetes in urban city.

III. METHODOLOGY

A. Product development

Product development is a nutritional context that means the act of developing a basic product into a new or value added
Product. Which is high in terms of nutrition and other health benefits? Because if quantity and sometimes almost mystical reputation and charecterstic of primary product their addition to other product usually enhances the nutritive value or quantity of these sensory products. The product is developed with combination of different fibre rich products. Basic recipe selected was methi paratha.

S.NO	INGRIDIENTS	BASIC(gm)	VARIATION 1	VARIATION 2	VARIATION 3
1	Whole wheat flour	300	300	300	250
2	Dry fenugreek greens	150	120	120	-
3	Green chillies	10	8	7	6
4	Carrot	10	8	7	6
5	Sesame seeds	-	2	2	1
6	Salt	1	1	1	1

Table 1- Ingridients used in preparation of basic and variations in grams.

B. Procurement of material

The raw material wheat flour, fenugreek, sesame seeds, carrot, green chillies & salt are obtained fron local market.
The product was standardised by mixing all the dry products together adding water making a thick dough out of it. This was treated as control or reference 1.
Five samples are prepared using sample 1 as reference or control. Oats act as primary ingredient. From sample 2-5 they are fortified with fenugreek at the rate of 10,20,30,40 grams of fenugreek greens and different fibre rich products.

C. Method of preparation

1) Firstly wash off all ingredients properly and cut them into small size.
2) then take a bowl with whole wheat flour and add all the ingridients to the flour with some water
3) make a thick dough out of it and make round chapattis
4) roast these chapattis on a pan until both sides are properly roasted

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5) Serve them with sour curd in a platter.

D. Standardization

Sensory quality is a combination of different senses of perception coming into a play is choosing and eating a food, appearance, flavour, and mouth feel decide the acceptance of the food. Once the standardization is completed 20 panel list were selected for both the trials of evaluation of both the basic and variation. The panel list included both working and retierd elderly people some procedure and temperature were maintained and followed for both trials as to minimize any kind of changes in the preparation of the might bring taste, texture, colour, and odour. The sensory evaluation was done as soon as the chapathi was made and served to panellist.

Samples were placed togather in front togather in front of each member with a score card to rate the four different recipie. A glass of water was also provided to drink in between assessment of four samples so that the panellist gets the exact taste.

E. Product distribution

The study on awareness of fiber foods among all age groups in diabetes was done by distributing developed product (meethi paratha) the place of study was Hyderabad. The people who were subjected to the awareness programme were diabetes of all age groups.

1) *Sample size and selection of subjects::* This sample consists of a total 50 subjects. The sample included members of all age groups mostly from middle age to old age. people belong to different castes and background.

E. Information collection

The information required was collected using a questionnaire method. The questionnaire used to collect the information was developed in English. The objective of study was kept in mind while constructing questionnaire it consisted of only close end questions with multiple choices. The content of questionnaire was divided into 2 headings.

1) *Genrel Information*: The general information was collected to get the following details like personal information of respondent age, gender, occupation, BMI, family history.

2) *Awareness information:*It include questions of close ended type. The question was regarding the use of fibre, preferred use of fibre.Each subject was provided with a sample of product ans was seen weather it was accepted by all diabetic people with 5 point hedonic rating scale.The product was developed keeping in mind the fibre requirement for diabetes.It consists of whole wheat flour, fenugreek greens,sesame seeds, chillies, carrot. In the basic only.in basic only whole wheat flour and fenugreek greens were added but in variation sesame seeds along with chillies and carrot were added.

S.NO	COST
BASIC	25.2RS
VARIATION 1	28.5RS
VARIATION 2	33.3RS
VARIATION 3	37.5RS

Table 2: cost view

F. Nutritive value of basic and variations:

CHAPATI	ENERGY(K.CAL)	PROTEIN(g)	FAT(g)	CARBOROHYDRATES(g)	IRON(mg)	FIBRE(g)
BASIC	1514	76.3	15.38	262.73	25.2	17
VARIATION 1	1472	70.9	13.6	252.4	23.8	16
VARIATION 2	1438	68.3	13	247	22	14.8
VARIATION 3	862	30.58	5.21	174	12.9	5.3

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1) *T- Developed:* Table 3- nutritive value of basic and variations (energy, protein, fat, carbohydrates, iron, fibre) are calculates
2) *T-Test:* T test was applied to find out the significance of difference between mean score of sensory properties of basic and variations.
3) *Formula applied:*Let x1 and x2 be two independent samples of size N1 and N2 respectivley. Suppose we want test the hypothesisH0 is the significance difference between the means of basic and variations under the null hypothesis. The H have been drawn from the same normal population has at distribution as per statics.

$$t=(x-y)$$

where X1=(xi-yi)

Y1=(yi-y)

IV. RESULTS AND DISCUSSION

The product was developed using fenugreek greens to enhance the nutritive value of chapatti.

A. *Product Development*

Product development in a nutritional context means the act of developing a basic product into a new or value added product which is high in nutrients and health benefits. For this reason,the secondary products usually partially or wholly can be made up of primary product are referred as “value added products” or “developed products”. Hence the products were developed by taking different proportions of fenugreek greens, which proven beneficial for diabetic individuals to lower their blood glucose level and other related diseases. Basic recipe selected was chapatti which is traditional breakfast recipe.

B. *Results of the palatability and acceptability trials of the formulated product*

The acceptance naturally depends primarily on those qualities that person readily perceives and experiences. These are appearance,taste,texture and flavour which are sensory responses of the person towards food. For measurement of sensory responses in the form of estimates of individual dimensions of overall quality we have to rely on human panels. Since each variation of product or a formulation could be tested consumer, level it becomes necessary to standardize the conditions of testing with selected panel under optimal conditions.

The palatability or eating quality of a food has two aspects. They are :

The sensory properties or stimuli coming from the food

C. *The attitude of the consumer towards the food*

All the formulated recipes were standardized first and then submitted for palatability and acceptability trials using hedonic rating test.

Table 4 : Results of sensory evaluation for methi chapatti

SENSORY EVALUATION	BASIC	VARIATION 1	VARIATION 2	VARIATION 3
Appearance	4.2	4.1	4.12	4.56
Taste	4.3	4.2	4.4	4.64
Texture	4.2	4.2	4.32	4.44
Flavour	4.3	4.04	4.36	4.58
Acceptability	4.4	4.3	4.30	4.54

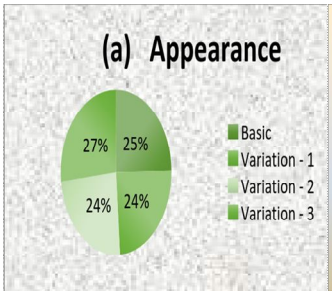


fig 1

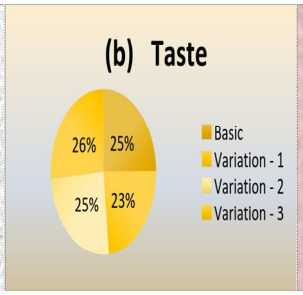


fig 2

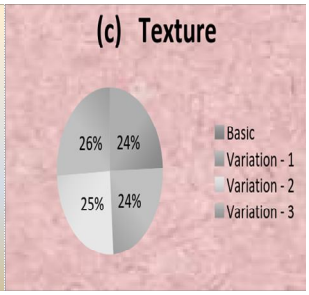


fig 3

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Fig 4 fig 5

Comparison of sensory attributes in percent of basics and the variations of methi chapatti
fig(1)Appearance, fig(2)Taste, fig(3)Texture, fig(4)Flavour, fig(5)Overall acceptability

D. APPEARANCE

It is the first appraisal of the food. The sense of sight plays an important role in the acceptability of food. The appearance of meethi chapatti- basic was 4.2 and the variations were 4.1, 4.12 and 4.56 respectively. The appearance was highest for the variation-3 which is 4.56, in which was entirely made of whole wheat flour and fenugreek greens only and both variations with sesame seeds, carrot, chillies.

E. TASTE

Taste is the important criteria for appraisal of food. Taste is sour .

1) *Texture:* Both texture and consistency are used to designate each of the imprecise used to characterize food. The consistency of food is an important factor affecting its general acceptance. Each food has its identifying consistency developing on its composition and its physical state. From the tables it is evident that mean scores for meethi chapatti Basic was 4.2 and the three variations 4.2, 4.32 and 4.44 respectively.
2) *Flavor:* Flavor is one of the most important factors in the acceptability of food. The mean scores for the flavor of basic methi chapatti was 4.3 and the three variations 4.04, 4.36 and 4.58 respectively. The variation - 3 has highest mean among all.
3) *Overall acceptability::* If the food is palatable then it is acceptable. The mean scores of the acceptability of basic meethi chapatti was 4.4 and the three variations 4.3, 4.30 and 4.54 respectively. The highest mean scores of the meethi chapatti were 4.5 for variation - 3 followed by basic and the least was for remaining.

Sensory analysis has been defined as “scientific discipline to measure analyze and interpret reaction to those characteristics of food and the material as they are perceived by the sense of taste, sight, smell ouch and hearing. Acceptance or rejection of food is largely based on stimulus of sense organs of individuals. The word hedonic is defined as “Pertaining to” or “Consistency in Pleasure”. This method is used to detect the difference in response to similar foods and it also helps to detect the difference in response to similar foods. This is the easiest and informative method which yields more difference than any other methods. The degree of liking is expressed on a scale of 5.The degree of sensitivity was tested among the students of Dept. of Food & Nutrition, Anwar ul uloom PG college using Hedonic rating test. All the samples were placed together on a table and a glass of water was also kept aside on the table. All the students were given instructions to have a sip of water before and after tasting each Sample.

From the results of both the trials, of all 25 students, it is inferred that the sample Variation – 3 of methi chapati, in which fenugreek was completely replaced with sesame seeds is highly acceptable with highest acceptability in each aspect. Final average of variation – 3 calculated from mean values is 4.6 and the final score of Basic,Variation – 1 and Variation – 2 being 4.2, 4.3 and 4.2 respectively.

Thus, from these results, we can expect the acceptance of fenugreek greens. The improvement in the dietary intake of fenugreek greens among the people can also be inferred.

F. NUTRITIVE VALUE CALCULATION OF DEVELOPED RECIPE

CHAPATI	ENERGY (K.Cal)	PROTEIN (gm)	FAT (gm)	CARBOHYDRATES (gm)	IRON (mg)	FIBRE (gm)
BASIC	1541	76.3	15.38	262.73	25.2	17
VARIATION 1	1472	70.9	13.6	252.4	23.	16
VARIATION 2	143	68.3	13	247	22	14.8
VARIATION 3	862	30.58	5.21	174	12.9	5.3

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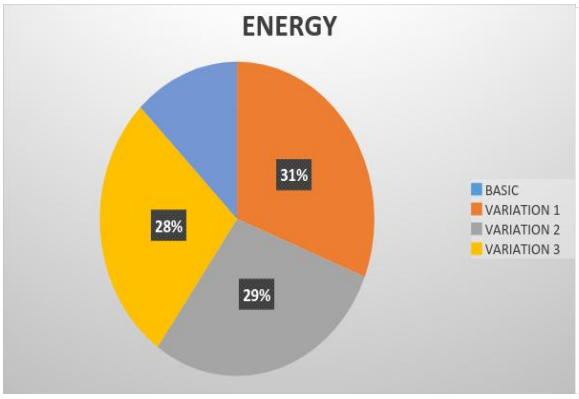


Fig 6

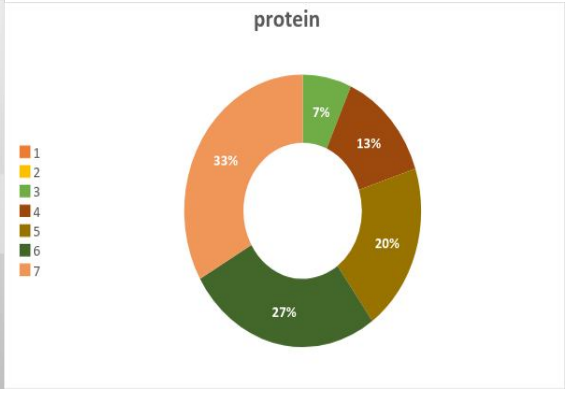


Fig 7

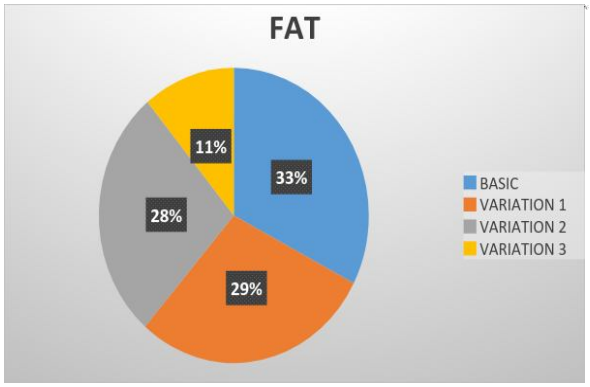


Fig 8

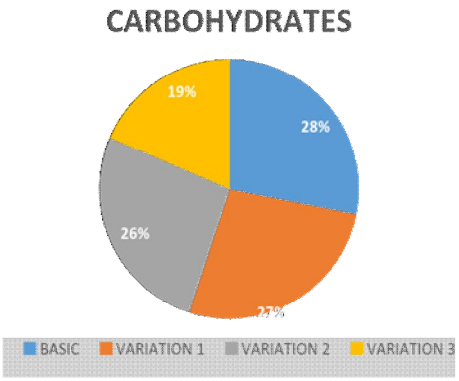


Fig 9

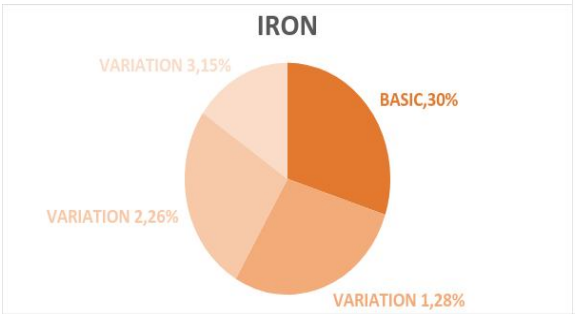


Fig 10

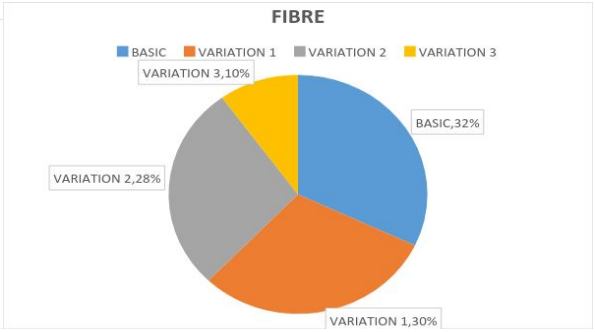


Fig 11

Table 6 : T-Test For Variaton 1 In Comparison With Basic- Methi Chapati

S.NO	SENSORY ATTRIBUTES	MEAN VALUE OF BASIC	MEAN VALUE OF VARIATION 1	"t" VALUE	RESULT
1	Appearance	4.2	4.1	2.062	Significant
2	Taste	4.3	4.2		
3	Texture	4.2	4.2		
4	Flavour	4.3	4.04		

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Critical value of "t" at p 0.05 is 2.306
Null hypothesis has been accepted because the t-value is less than 2.306

Table 7 : test for variations 2 in comparison with basic-methi chapathi

SNO.	SENSORY ATTRIBUTES	MEAN VALUE OF BASIC	MEAN VALUE OF VARIATION 2	"T"-VALUE	RESULT
01.	Appearance	4.2	4.12	0.327	Significant
02.	Taste	4.3	4.4		
03.	Texture	4.2	4.32		
04.	Flavor	4.3	4.36		

Critical value of't' at p 0.05 is 2.306.
Null Hypothesis has been accepted because the t-value is less than 2.306

Table 8 : T-Test For Variation 3 In Comparison Wit Basic-Methi Chapathi

NO.	SENSORY ATTRIBUTES	MEAN VALUE OF BASIC	MEAN VALUE OF VARIATION 2	"T"-VALUE	RESULT
01.	Appearance	4.2	4.56	4.669	Insignificant
02	Taste	4.3	4.64		
03.	Texture	4.2	4.44		
04.	Flavor	4.3	4.58		

Critical value of't' at p 0.05 is 2.306. Null Hypothesis has been rejected because the t-value is greater than 2.306 .

Table 9: Cost Analysis

The Food cost of the developed recipes was calculated. The detailed cost of the basic and the variations of both the recipes is shown in the (Annexure VI a & VI b).

Recipe	Cost (Rs.) (per Serving)
Basic	25.2rs
Variation – 1	28.5rs
Variation – 2	33.3rs
Variation – 3	37.5rs

The food cost of Basic was calculated to be Rs.25.2 while that of variations was Rs.28.5, Rs.33.3 and Rs.37.5 respectively.

Table 10: do you exercise if yes how often ?

S.NO	EXERISE ROUTINE	PERENTAGE
1.	DAILY	20%
2.	WEEKLY	40%
3.	NEVER	40%

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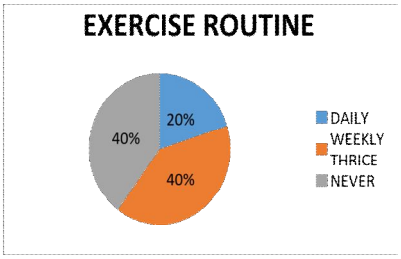


Fig 12- 20% of population exercises daily, 40% weekly thrice, 40% never.

Table 13: do you take care of your foot hygiene?

S. NO	FOOD HYGIENE	PERCENTAGE
1.	YES	70
2.	NO	30

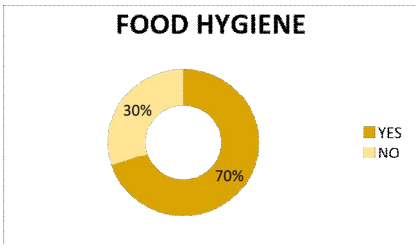


Fig 13- 70% of population take care of their foot and 30% don't.

Table 14 : how often do you check your sugar levels?

S. NO	SUGAR LEVELS	PERCENTAGE
1.	DAILY	10
2.	OCCASIONALLY	20
3.	MONTHLY	30
4.	WEEKLY	40

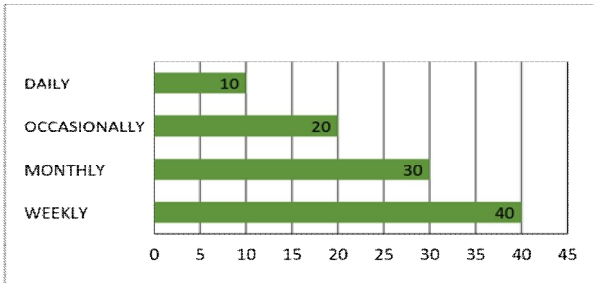


Fig 14- 10% of population check sugar levels daily 20% ocassionally,30% monthly and 40% weekly

Table 15: are you aware of ill effects of diabetes?

S.NO	AWARE OF I'LL EFFECTS OF DIABETES	PERCENTAGE
1.	YES	90
2.	NO	10

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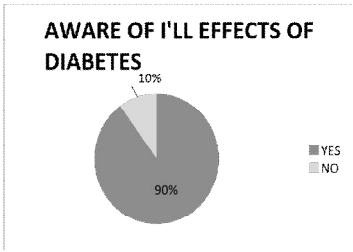


Fig 15- 90% of population was aware of diabetes and 10% were not.

Table 16: do you know about diet in diabetes?

S. NO	AWARE OF DIET IN DIABETES	PERCENTAGE
1.	YES	40
2.	NO	60

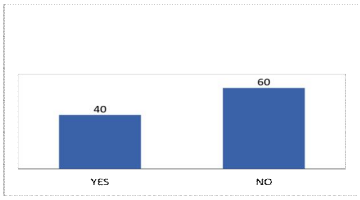


Fig 16- 40% were aware of diabetes and were not.

General Information Of Panelists Selected For Consumer Awareness

	GENERAL INFORMATION		
No. of panelist = 25	GENDER	Males - 9	Females - 16
	AGE	32 to 45 years - 18	45 to 55 Years - 7

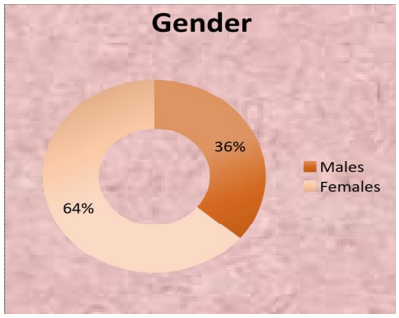


Fig 17 (a) 36% of population selected For consumer awareness were males and 64%.

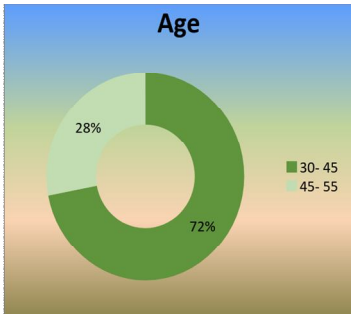


fig 17 (b) Age of the population 72% were of age between 30-45 and 28% were of Age 45-55Were females

V. CONCLUSION

The English name derives via middle east French fenugrec from latin faenugraecum, faenum Greacum meaning “Greek hay” Major fenugreek production countries are Afghanistan, Pakistan, India, Iran, Nepal, Bangladesh, Argentina, Egypt, France, Spain, turkey. The largest producer in India. Fenugreek production in India is concentrated in the states of Rajasthan, Gujrat, Uttar Pradesh, Uttarakhand, Madhya Pradesh, Maharashtra, Haryana, & Punjab. Fenugreek is used as a herb, spice,and vegetable. Used usually in pickles, salads, vegetable dishes, daals, and spice mixes such as panch phoron and sambhar. Fresh fenugreek used in cooking Indian curries. Sproutes and microgreens are used in salads. In Turkish cuisine fenugreek seeds are used in making paste called cemen. Some people are allergic to fenugreek and people who have peanut allergy and chickpea allergy may have a reaction to fenugreek.

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Fenugreek seeds can cause diarrhea, dyspepsia,, abdominal distention, flatulence,perspiration, and maple like smell to urine or breast milk. It causes birth defects in animals and there are reports that it also causes birth defects in humans,and that it can pass through placenta it also appears to negatively affect male fertility, female fertility and the ability of an embryo in animals and humans. In traditional medicine, fenugreek is thought to promote digestion, include labour, and reduce blood sugar levels in diabetics although the evidence for these effects in lacking constituents of fenugreek seeds include flavonoids, alkaloids, coumarins, vitamins.

VI. AKNOWLEDGEMENT

Gratitude cannot be seen or expressed it can be felt deep in heart and is beyond description. Although thanks are poor expression of debt of gratitude one feels yet there is no way to express. A formal statement of acknowledgement will hardly meet the ends of justice in the matter of expression of deeply felt sincere and heartiest gratitude to my research guide Ms. Tanveer Fatima assistant professor, dept of food and nutrition Anwar Ul Uloom collage for constant encouragement, painstaking efforts in suggesting designing and improving the quality of study throughout the entire research work and consummating this manuscript.

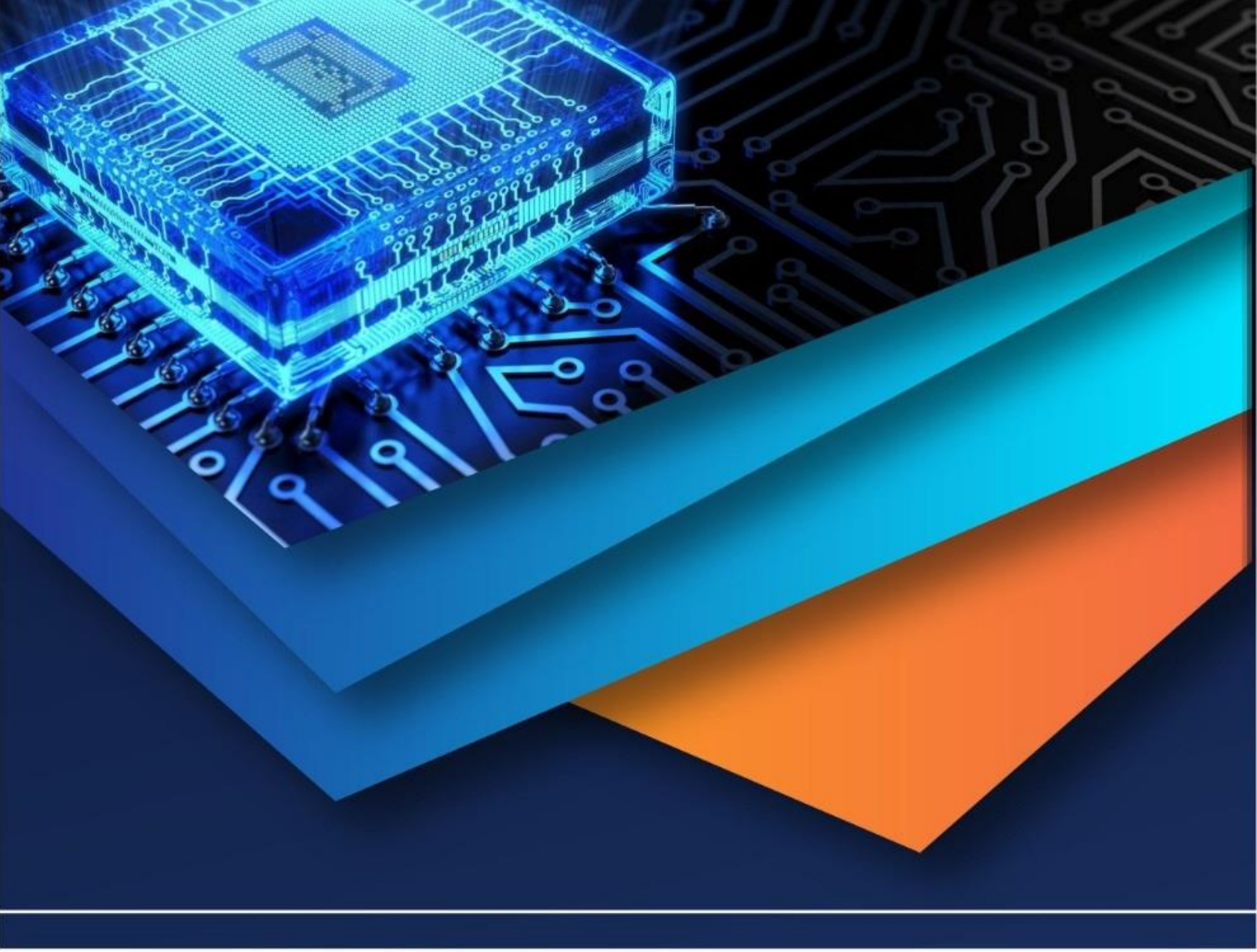
Not to be forgotten is my family and friends who were supportive all the way. To them I can only offer mu deep appreciation for their willingness and patience.

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