DIET IN INDIAN DIABETICS

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The importance of diet in the management of diabetes dates back to 3500 B.C. Dietary principles to control Madhu Meha for diabetes mentioned in Sushruta and Charaka hold good even today.

Cooked barley, barley porridge with roasted gram powder was recommended.

> "As the Food so the mind,
> As the mind, so the man"
> Gita, chapter 4, Verse 39-40.

There are some who through systematic regulation of diet come to gain a complete mastery over themselves and their appetites and passions.

GOALS OF DIET THERAPY

1. To maintain optimum nutrition 2. To achieve ideal body weight 3. To maintain glycaemic control 4. To relieve patients of obvious symptoms. 5. To minimize chronic degenerative complications.

Adapting diet therapy to the specifice needs of an individual is most essential and dietary recommendations differ in cases of pregnancy, child-hood, sickness or in cases of associated complications.

DIET

Diet plan of an individual is based on ones height, age, weight, sex, physical activity and nature of diabetes; and the most essential components to be considered are.

Calorie requirements

Recommended K Cal/Kg of IBW- 25

Calorie distribution

Carbohydrates : 65%

Proteins   : 29%

Fats   : 20%

Carbohydrate Distribution

Breakfast	1/7
Lunch	2/7
Dinner	2/7
Tea Time	1/7
Mid Morning	1/7
Bed Time	

All meals are planned according to the exchange list based on different food groups.

A study was conducted (in 1982) in the Diabetic clinic of A.I.I.M.S. to assess the Nutritional profile of IDDM compared to NIDDM in North India.

	IDDM	NIDD
Mean age (years)	30	60
Mean body weight (Kg)	48	61.5
Mean blood glucose (mg/100 mL)		
Fasting	148	156
Post-Prandial	286	221
Mean dose/day-insulin (units)	50	—
Oral drug Glybendamide (mg)	—	10

The dietary pattern followed

	IDDM	NIDDM
Total Calories	1600	1600
Proportion of CHO(g)	205	205
Frequency of meal (number)	6	5
Compliance %	75	60

Dietary practice in both groups is not so different as the individuals share family needs, economic reasons did not permit such diabetics, persons for individualising their diets.

This was re-inforced once again in (1984) when a study was conducted in our clinic to assess the fats and oils in the diets of Indian diabetics. Patients were randomly selected from diabetic clinic & diet assessed by 24 hrs-recall method.

Clinical Profile of 150 patients analysed

Sex		Mean Age	Mean weight	Mean ht.	EMI	Mean duration
M	F	(years)	(kg)	(M)		(years)
70	80	50	63	1.63	23.7	7.7

Treatment

Diet	Diet+Oral drugs	Diet+ Insulin
%	%	%
20	61	19

Biochemical Profile

Blood Glucose

Mean F	Mean P.P.	Mean serum cholesterol	Mean serum Triglycerides	Mean Macro Vascular disease	Mean Micro Vascular disease
mg	mg	mg%	mg%	%	%
147	219	223	166	24	46

Dietary Pattern

Total Calories :	Mean	1600
	Range	(1100-2040)
Fat (g)	Mean	60
	% of total Calories-33-37%	
Saturated Fat	36 (g)	
Opiec acid (g)	13.1	
Linoleic acid (g)	4.5	
Cholesterol mg %	184	
Fibre	9-14g/day,	

What we found was that those consuming more than 1500 Cals/day, non vegetarians and non compliant to diet have higher serum cholesterol and triglycerides values and macrovascular diseases. Mierovaseular disease was not related to diet.

Glycaemic control was better in vegetarian and on diet complainant group.

Patients of high income group, non vege-tarian, had fat consumption in excess of 35%

of total calories, with diet cholesterol of 295 mg/day as compared to vegetarian who consumed only 70 mg of cholesterol/day.

Serum cholesterol in non veg. : 228 mg/dl
Serum T.G. in non veg. : 183 mg/dl
Serum cholesterol in veg. : 180 mg/dl
Serum T.G. in veg. : 150 mg/dl

Conclusion

Vegetarianism and low cholesterol content of diet are related to lower lipid & less macro vascular diseases.

Similarly a study was conducted to assess the proteins in diabetes mellitus 1987.

Clinical Profile of 100 Patients

Sex M F	Mean Age (years)	BMI Mean	Mean Income/month Rs.	Treatment Diet Oral Insulin
47 53	48.7	25.5	1015	30 60 10

Biochemical Profile

Blood Glucose mg/dL		Mean HBA1e
F	P.P	
140	197	9.45%

Diet Analysis

	Veg. (71)	Non Veg. (22]
Total Cals.	1800	1900
Proteins g.	45.2	48.4
% of total Cals.	10.1	10.1
Complete proteins (36%)	18.0	19.7
Proteins limiting lysine (30%)	14.1	16.1
Proteins limiting Methionine (34%)	13.1	12.6

Serum Proteins Values

' Total Proteins	=	6.8 g
Albumin	=	4.2 g
Globulin	=	2.6 g
Mean Pre-albumin	=	24.4 mg

Only 18 patients had values less then 11 mg% (-2SD) i.e. 7.8 mg% (± 1.6 SD)

These patients had a BMI less than 19

Non Veg. were 4 and Veg. were 14

20 healthy controls had a pre albumin value of 26, 24%.

In India with incumbent nutritional handicap longevity of diabetics is 10 years as compared to 30 years in developed countries.

Mean period of onset of complications amongst diabetics is 7years as compared to 15 years in developed countries.

To conclude, proteins consumption is 10% of total calories and only 36% of it being a complete proteins, vegetarianism be followed by 3/4th of the population leads to lower incidence of cardiovascular complications which relates to the fact that early onset of complications and reduced longevity of diabetics relates to poor metabolic control of frequent infective complications and reduced immunological resistance.

We all know that it is not just the % of dietary constituents in the diet that matters but also the quality in terms of glycaemic Index (GI) that is the blood glucose response of a particular food or a meal. Factors affecting the G.I. are the composition of starch, the size of starch molecule, and its digestibility which is affected by cooking and methods of preparation.

Other than starch, fibre content of the diet and a fat—protein combination also has a role to play.

Since a lot of work has been done on the G.I. of individual foods we conducted a study to find out the G.I. of mixed meals:- (1987).

Clinical Characteristics of Volunteers

Mean Age (years)	Mean BMI	Duration
40-60	20% of IBW	0-28 years

Composition of test meals

Ingredients	Qty (g)	CHO (g)	Proteins (g)	Fats (g)	Fibre (g)
Diet A — Chappati					
Whole wheat flour	25	34	8.0	—	-1.5
Bengal gram flour	25				
Curds	200	8.0	6.0	6.0	—
Green Veg.	125	7.0	2.0	—	1.0
Cooking Oil	5	—	—	5.0	—
		49.0	16.0	11.0	2.5
Diet B—Rice					
Rice	2S	19.0	2.0	—	0.1
Sumbar	25	15.0	5.0	—	—
Curds	200	8.0	6.0	6.0	—
Green Veg.	125	7.0	2.0	—	1.0
Cooking Oil	5	—	—	5.0	—
		49.0	16.0	11.0	1.1

Diet C— *Bread*

White bread slices	60	30.0	4.0	—	—
Cutlet-chicken	25	—	7.0	—	—
potato	50	10.0	—	—	—
peas	25	2.0	—	—	0.1
Milk	200	8.0	6.0	6.0	—
Cooking Oil	5	—	—	5.0	—
		50.0	17.0	11.0	0.1

Glycaemic Index of three mixed meals (%)

Diet— A	Diet— B	Diet-C
G.I.— 69.0	80.4	80.0
S.D. ±3.13	S.D. ± 1.14	S.D. ± 0.71

To conclude-meals containing complex carbohydrates with higher fibre have lower glycaemic Index.

A thorough mixing of fibre with carbohydrate seems important for its effectivity. In natural foods like beans, fibre is mixed thoroughly with absorbable carbohydrates and hence is ideally suited for the diabetic. Based on this theory we standardized a non-glycaemic snack and conducted a study to see its glycaemic effect. The snack was prepared from soya beans.

No. of patients 25 (NIDDM), both Male & Female.

Age group of 35-55 years.

These subjects were administered on two consecutive occasions

(a) 100 g. glucose and blood glucose values taken at fasting and 2 hours level.

(b) 400 Calories equivalent of a Soya Snack and blood glucose values taken at fasting and 2 hours after snack.

The Composition of the Snack

	Amount (g)	CHO (g)	Proteins (g)	Fat (g)	Fibre (g)
Soya nuggets	60	15.0	30.0	1.0	3.0
Jaggery (caramelized)	55	52		—	—
Wheat bran	12	1 0	—	—	10.0
		68.0	30.0	1.0	13.0

Results

Item	No. of Patients	Blood glucose mean
100 g Glucose	25	68% Rise (F/PP)
Soya snack	25	7% Rise
Soya snack	15	19% Rise (F/PP)
Soya snack	8	8% Fall (F/PP)
Soya snack	2	no change

The snack was equivalent to chiki/Soya brittle and was acceptable to patients from taste point of view. It had a long shelf life and could be easily stored for 4 weeks in any home condition.

The non glycamic effect could be attributed to its high fibre contents.

From all these studies we have seen that the most common problem amongst our NIDDM is obesity. There are studies to show that patients put on strict diet and exercise lose weight temporarily and gain is almost immediate on leaving treatment. Therefore, behaviour therapy or psychogenic approach is important in the management of obesity and there are several studies to prove that behaviour pattern modification have proved to be better than dietary counselling alone. So we combined the study to see the effect of diet/activity/behaviour therapy in the obese.

50 obese patients both male and female were randomly selected from Endocrine clinic. Physical characteristics of all the patients were collected along with the diet history, daily activity and behaviour pattern.

Mean Age years	Mean BMI M F	Mean duration years	Income L. M H	Genetic	Acquired
38 8	30.7 34.1	10.7	3 11 36	66%	34%

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                                                        Simple        Metabolic
                                                         64%            36%

                                                         IGT          Hormonal
                                                         11%            18%
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	Cals/Kg	Fibre (g)
Previous diet	28	7
Previous diet	20	15-20
Previous activity	sedentary	
Advised exercise	1 hr. of brisk walk (4 km/hr.)	

For behaviour pattern a Master questionnaire was used. It was divided into five categories (i) Stimulus control (ii) Helpless/Hopeless (iii) Motivation (iv) Born fat (v) Energy balance knowledge.

The following advice was given for behaviour modification.

(1) Self monitoring of eating behaviour, amount of food consumed, the time, the circumstances e.g. how many mouth fulls? How many cold drinks?

(2) Change in stimulus control of eating : tempting snacks not to be purchased, food storage to be reduced and food to be kept out of sight.

(3) Alter eating style : eat slowly, chew more, leave the plate down in between.

(4) Calorie modification/Nutrition education; exchange list.

(5) Increased physical activity : walking, using a stair case, walking instead of driving.

(6) Relaxation techniques to control or reduce anxiety.

% Fall in weight

Kind of obesity	No. of Patients	Mean wt. kg.	% Fall in 1 week	% Fall in 2 weeks	% Fall in 3 weeks
Simple	32	87.0	7.0	7.7	10.7
Metabolic	18	84.4	3.2	5.5	7.9
Duration					
Less than 5 years	7	78.8	3.4	7.5	11.2
5-10 years	23	85.1	3.8	7.1	300
More than 10 years	20	89.4	3.5	6.3	8.1

— Differences was insignificant.

Behaviour pattern

Stimulus control =40% level

Helpless/Hopeless = 65% level

Motivation=48% level

Born fat = 73% level

Energy balance knowledge = 50% level

To conclude, patients lost weight irrespective of age and sex. Patients with simple obesity and with shorter duration proved better. Frequent counselling proved beneficial.

In old Indian literature there are indigenous drugs recommended to treat diabetics depending upon their taste and since diabetes is considered a disease of sweets and sugars, agents with bitter effects have been in vogue for centuries.

The hypoglycaemic effect of this type of bitter can be speculative and based on its astringent properties, the absorptive level of glucose is modified from the gut either due to hormone or plasma insulin response.

A diabetic who is a vegetarian, takes whole some and coarse food with natural fibre, mixed proteins and restricted fats of unsaturated nature will lead a healthy life.

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