Recent Trend of Diagnosis Criteria, Goal and Dietary Recommendation for Type II Diabetes and an Assessment of the Role of Recommended Dietary Intake for Good Control (DM II)

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Abstract

Diabetes mellitus is a metabolic disease characterized by hyperglycemia resulting from defects in Insulin secretion and action or both. The chronic condition is associated with long term damage, dysfunction and failure of various organs, especially eyes, kidneys, nerves, heart and Blood vessels. India is a diabetes capital of world. The prevalence was estimated approx9 percent and projected 300 million individuals would be affected with this metabolic disorder up to 2025. Recent changing (ADA 2009) of diagnosis criterion, goal and dietary recommendations for management of DM II from blood sugar level to Glycosylated haemoglobin level attract attention to researcher to assess the role of dietary recommendations for controlling DM II among Indian population and this paper was an effort on aforesaid issues. The paper was prepared at Barabanki city of State Of U.P. The validation cohort n=100 intervention group and 10 in control group. The main finding of this paper was through intervention as per recent guidelines of ADA 2009; it was observed that 46% subjects under control of DM II as per goal of glycosylated haemoglobin levelupto7% through desirable changes in dietary intake among 52% per cent. The calculated value of Chi-square it was found much more higher (18.0) as compared to table value (3.841) at one degree of freedom and five percent significant level. The null hypothesis rejected and alternate hypothesis accepted that is those patients were awaired and taking diet as per recent trend laid down latest guideline by ADA with prescribed drugs was observed of good control type II diabetes.

Keywords: Metabolic disease, hyperglycemia, metabolic disaster, glycosylated haemoglobin,

Introduction

India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the "diabetes capital of the world", Report showing about 31.7 million people (2000) and estimated 79.4 million by the year 2030 According to the Diabetes Atlas 2006 published by the International Diabetes Federation, the number of people with diabetes in India currently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken. It has been projected that 300 million individuals would be affected with diabetes by the year 2025[1]. The prevalence of diabetes among the age group 30 and 30+ years of age was estimated 9.1% as compared to Calcutta 1.78% in Urban and 1.48% in rural population and Delhi 0.95% in Urban and 1.53% in rural areas. Diabetes mellitus is a metabolic disease characterized by hyperglycemia resulting from defects in Insulin secretion, Insulin action or both[2]. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction and failure of various organs, specially the eyes, kidneys, nerves, heart, and blood vessels. The term Impaired glucose tolerance (IGT) and Impaired fasting glucose refer to a metabolic stage in intermediate between normal glucose homeostasis and diabetes, now referred to as pre-diabetes.

ADA 2003 Criteria: This stage includes individuals who have IGI and individuals with fasting glucose levels: $\geq$ 110 mg/dl (6.1mmol/l) but, < 126 mg/dl (7.0mmol/l) (IFG).

The term IFG was coined by Charles et.al.[3] to refer to as fasting plasma glucose (FPG) level $\geq$110 mg/dl (6.1mmol/l) but < 140 mg/dl (7.8mmol/l)

ADA 2008[4] Diagnosis of diabetes/ pre-diabetes. Diabetes is diagnosed when: = FPG $\geq$ 126 mg/dl (7.0 mmol/l) or = Symptoms of hyper-glycemia and a casual plasma glucose $\geq$ 200 mg/dl (11.1 mmol/l) or = 2-h plasma glucose $\geq$ 200 mg/dl (11.1 mmol/l) during an OGTT. Diagnosis of Pre-diabetes when: = IFG=FPG = 100 mg/dl (5.6 mmol/l) to 125 mg/dl (6.9 mmol/l), = IGT= 2h plasma glucose 140 mg/dl (7.8 mmol/l) to 199 mg/dl (11.0 mmol/l)

One is often asked if an estimation of Glycosylated Haemoglobin level can be used as the parameter to diagnose diabetes. It should be made very clear that irrespective of the advances made in the methods for estimating HbA-1C. Before 2010 it was not an acceptable parameter. The argument that a very high glycosylatedhaemoglobin level would be diagnostic for diabetes can be very easily countered by the fact that if the

glycosylated haemoglobin level were indeed to be so high, then it is apparent that even a random estimate of the blood glucose levels would show it to be in the distinctly "diabetic" range.

ADA 2009: The most recent glycemic goal recommended by the American Diabetes Association, selected on the basis of practically and the projected reduction in complications over time, is, in general, as HbA-1C level of <7%[5]. The general consensus was that an HbA-1C level of ≥ 7% should serve as a call to action to initiate or change therapy with the goal of achieving an HbA-1C level of <7%. It was a turning point to diagnose the diabetes from previous one. It also advises to change intervention at as rapid a pace as titration of medications allows when target glycemic goals are not being achieved.

DCC Trail: HbA-1C is the primary target for glycemic control.HbA-1C goal for adult is <7%. For selected individuals the HbA-1C goal is as close to normal (<6%) as possible without significant hypoglycemia. Less stringent HbA-1C goals may be appropriate for patients with a history of severe hypoglycemia, with limited life expectancies, with co morbid conditions, and those with longstanding diabetes and minimal or stable micro-vascular complications.

Non-Clinical Recommendations

The aim of nutrition in diabetes mellitus is to give a balanced diet. Keep below BMI below 25, keep the HbA-1C below 8% and, help in preventing long term complications of diabetes. While planning diet it is not the restriction of a particular diet it is not the restriction of a particular food which is important but to select proper food. In meal planning, patients food habits palatability, acceptance of food were all to be considered.

After knowing the ideal weight of a patients calories are calculated. The total calories are translated into 50% carbohydrates 20% protein and 30% fat, 10% each has to come from polyunsaturated, mono unsaturated and saturated fats[6]. Historically, nutrition recommendations for diabetes and related complications were based on: i. Scientific Knowledge, ii. Clinical Experience, iii. Expert Concensus.

To address many problem, the 2002 technical review and this position statement provide principles and recommendations classified according to the level of evidence available using the American Diabetes Association evidence grading system. However, the best available evidence must still take into account individual circumstances, preferences and cultural and ethenic preferences, and the person with diabetes should be involved in the decision- making process. The goal of evidence based recommendations is to improve diabetes care by increasing the awareness patients with diabetes about beneficial nutrition therapies[6].

For essential and successful diabetes management, The American Diabetes Association initiated Medical Nutrition Therapy during 2002.

The goals of Medical Nutrition Therapy were as follows: i. Attain and maintain optimal metabolic outcomes including: Blood glucose levels in the normal range or as close to normal as is safely possible to prevent or reduce the risk for complications of diabetes. A lipid and lipoprotein profile that reduces the risk for macrovascular disease. ii. Blood pressure levels that reduce the risk for vascular disease. Prevent and treat the chronic complications of diabetes. Modify nutrient intake and life style as appropriate for the prevention and treatment of obesity dyslipidemia, cardiovascular disease, hypertension and nephropathy. iii. Improve health through healthy food choices and physical activity. iv. Address individual nutritional needs taking into consideration personal and cultural preferences and life style while respecting the individuals wishes and willingness to change.

Approach to Management of Medical Nutrition Therapy: Medical Nutrition Therapy: MNT is an integral component of diabetes prevention, management and self management education. The medicines may be rendered ineffective in absence of proper diet regimen. For weight loss, either low carbohydrate or low-fat caloric restricted diets may be effective in the short term (upto 1 year) Saturated fat intake should be <7% of total calories. Intake of trans fat should be minimized. Monitoring carbohydrate intake remains a key strategy in achieving glycemic control. For individuals with diabetes, the use of the glycemic index and glycemic load may provide an additional benefit for glycemic control over that observed when total carbohydrate is considered alone. Sugar alcohols and non-nutritive sweeteners are safe when consumed within the acceptable daily intake levels established by the US, FDA. If adults with diabetes choose to use alcohol, daily intake should be limited to a moderate amount (one drink per day or less for adult women and two drink per day or less for adult men). Routine supplementation with antioxidants viz. Vitamin B, Vitamin C and Corotene, is not advised because of lack of evidence of efficacy and concern related to long term safety. Benefit from chromium supplementation in people with diabetes or obesity has not been conclusively demonstrated and, therefore, cannot be recommended.

Physical Activity

Regular exercise has been shown to improve blood glucose control, reduce cardiovascular risk factors, contribute to weight loss, and improve well being.

Recommendations: Diabetes should perform at least 150 min/week of moderate intensity aerobic physical activity (50-70% of maximum heart rate). In the absence of contra-indications, people with type II diabetes should be encouraged to perform resistance training three times a week.

Recent Trend of Dietary Management of Diabetes Mellitus II among Indian Population: Dietary management forms the corner stone of any treatment regimen in diabetes, although the

proper implementation of diet therapy is often a big problem mostly due to individual reasons. The aim of the dietary therapy is to bring the weight as nearest to the ideal body weight as possible for the height of the patient. Body mass Index (BMI) can be used to ascertain obesity more accurately. The fast food culture has overwhelmed our cities and towns and has emerged as a major driver of the diabetes epidemic. In a study conducted in school age children in New Delhi, 18% were found to be over, weight and 27% were found to have impaired glucose tolerance (IGT). It is estimated that 15-25 percent of urban school children in India are at risk of developing type II diabetes at an early age[7].

Objectives of Dietary Modifications: Maintain optimal metabolic outcome that include: i. Normal blood glucose levels in order to prevent or decrease the risk of complications. ii. An ideal lipid and lipoprotein profile that reduce the risk of macrovasculardisease. iii. Normal blood pressure levels to reduce the risk of vascular disease, iv. To modify intake of nutrients and other life style factors as appropriate for the prevention and treatment of obesity, hypertension, dyslipidaemia, cardiovascular disease and nephropathy. v. To improve health through healthy food choices and physical activity. vi. To individualize the nutritional needs, taking into consideration personal and cultural preferences and life style. vii. To facilitate changes in eating and physical activity habits that decrease insulin resistance and improve metabolic control. viii. To provide for the nutritional needs of an ageing individual. ix. To decrease the risk of transition from IGT to diabetes by encouraging physical activity and promoting food choices that facilitate moderate weight loss or at least prevent weight gain.

Food Characteristics

Fats: Quality and amount of dietary fat may have modifiable effect of glucose tolerance and insulin sensitivity. A high fat content in the diet may result in deterioration of glucose tolerance. The fatty acid composition of the diet affect tissue phospholipid composition which may relate to insulin action. High fat diets result in insulin resistance relative to high carbohydrate diets. In two cross-sectional studies, total fat intake was found to be higher in glucose intolerant and type II diabetes subjects.[8] The substitution of mono-unsaturated fat for saturated fat significantly improved insulin sensitivity in healthy subjects after a three month period. The favorable affect of this substitution was lost in individuals consuming more than 37% of energy from fat[9]. There exists a positive association between trans fatty acid intake and risk of type II diabetes[10]. An increase in post prandial c-peptide and insulin responses was noted in type II diabetes patients after a 6-week diet high in trans fatty acid (20% of energy) as compared with a diet high in cis-monounsaturated fatty acids.

Carbohydrates: Guidelines recommended an intake of a variety of grain products, including whole grains. Carbohydrate in the diet should compriseatleast 55% of total energy intake as

recommended by FAO/WHO. The type and source of carbohydrate is more important than the quantity[11]. Glycaemic Index (GI) and Glycaemic Load GL. It is defined as the glycaemic response elicited by a 50 gm carbohydrate portion of a food expressed as a percentage of that elicited by a 50 gm portion of a reference food (e.g. glucose). High glycemic Index (GI) foods have higher 2-hours areas under the glucose curve than the reference food, while low glycemic index (GI) food have lower areas. The use of glycemic Index could provide an additional benefit for diabetes control beyond that of carbohydrate counting. Diets with a lower Glycemic Index (GI) has been found to be associated with modest improvements in glycosylated haemoglobin. Nutritional plans based on the judicious use of the glycemic index positively affect post-meal plasma glucose excursions. A dietary intake of 25gm of fibre per 1000 kCal is considered optimum for a diabetes person.

Objective of Paper: The objective of the paper is to analyse recent trend of diagnostic criteria, goal and dietary recommendation and assessing the role of dietary intake for good control of type II diabetes.

Hypothesis: Null: Those patients were awared and taking diet as per recent trend of interventional guidelineand with drug were not not good controlled type II diabetes (glycosylated haemoglobin less than 7%).

Alternate: Those patients were awared and taking diet as per recent trend of interventional guideline with prescribed drugs were good controlled type II diabetes (glycosylatedhaemoglobin less than 7%).

Methodology

Area: The paper was prepared on the subjects of Barabanki city state of Uttar Pradesh. Those taking clinical advice in different private nursing homes.

Sample Size: All the subjects purposively selected those were known diabetics of type II; a 100 subjects were selected for the purpose of paper in intervention group and II in control group.

Tools: An interview schedule methods used for recording the information at face to face situation from each patient.

Parameter: i. Glycosylated haemoglobin, ii. Blood sugar. iii. Nutritional Assessment on the basis of 24 hours dietary recall. iv. Awareness rating scale.

Design: Exploratory cum explainatory research design.

Analysis of Data

The collected date were tabulated and analysed in accordance with statistical and scientific methods.

Table–1
World Health Organization Criteria

		Whole Blood		Plasma	
		Venus	Capillary	Venus	Capillary
Diabetes	F	>120	>120	>140	>140
2 hrs.	PP	>180	>200	>200	>200
IGT	F	<120	<120	<140	<140
	PP	120-180	140-200	140-200	160-200

Table–2
Correlation between HbA-1C level and mean plasma glucose levels on multiple testing over 2-3 months

A'C%	Mean Plasma Glucose	
	mg/dl	mmol/l
6	135	7.5
7	170	9.5
8	205	11.5
9	240	13.5
10	275	15.5
11	310	17.5
12	345	19.5

Table-3
Interventional Guideline, Dietary and Exercise Recommendations for persons with Diabetes

Carbohydrate	60% of total energy intake.
Dietary fibre	14 gm/ 1000 kCal
Total Fat	30% of total energy intake
Saturated fat	<10% of total energy intake
Polyunsaturated fat	10% of total energy intake
(PUFA) (emphasizing n-3) monounsaturated fat(MUFA)	10% of total energy intake
Trans Fat	As low as possible
Cholestrol	<300 mg/day
Protein	1.0 gm/kg body wt./day
Absence of renal insufficiency	0.8 gm/kg of body weight/day
Presence of renal insufficiency	0.6 gm/kg of body weight/day
Almonds/Walnuts	10 Nos.
Garlic	3-5 gms per day
Energy	Maintain Body mass index < 25 kg/m^2
Sodium	<2300 mg/day
Calcium	1000-1300 mg/day
Alcohol (if habitual)	
Men	≤ 2 drinks/day
Women	≤ 1 drink/day
Exercise	30-60 inutes, 3-4 times/week

Annexure–4
Dietary Pattern of Diabetes

Dietary Pattern	% of Patients
Type of Meal	
Vegetarian	40%
Non-Vegetarian	60%
Meal for day	
Three meals	34
Three meals and snacks	52
Two meals	2
Two meals and snacks	12

Conclusion

Age and Sex Wise Distribution of Subjects : A 30% female and 70% male which include 16% below age group 30 years, 15% of the age group 30-40 years, 20% of the age group 40-50 years, 24% of the age group 50-60 years and 25% of the age group 60+ years.

The religion of the subjects: 53 percent hindus 38%muslim, 3 percent Christian and rest 6% Sikhs.

Academic Status: 22 percent illiterate, 42 percent school level; 26 percent college level and rest 10 percent graduate and post graduate levels.

Economic activity status : 36 percent businessman, 18 percent retired from government jobs, 6 percent engaged in private jobs, 18 percent teachers, 22 percent house wife. According to Income Level of families 23% are below Rs. 10000 p.m., 26 % Rs.10000-20000 p.m., 28 percent Rs. 20000 to 30000 p.m. 21 percent Rs. 30000-50000 p.m.

Obesity Status: 23 percent were thin, 42 percent were healthy and 24 percent over-weight and rest 11 percent obese. The average intake of food ingredients before intervention; cereal; 115 gm, pulses; 38 gm, milk 62 ml, fruits 91 gm, vegetable 116 gm, meat 26 gm, poultry 21 gm, oils and fats 48 gm, sweets 26 gm, beverages 110 ml. The average intake of food ingredients after intervention intake of ; cereal-135 gm, pulses 58 gm, milk-180 ml, fruits-176 gm, vegetable preferably seasonal green 210 gm, meat 18 gm poultry 16 gm oils and fats; 30 gm. Through intervention table-3 the changes in nutritional intake observed among 52 percent respondents. The major changes were observed in salt restriction, milk intake, fruits and vegetable intake, sweets and beverages restriction, nuts intake, garlic intake etc. The non-vegetarian foods either avoided or taken by fat free portions by non-vegetarian respondents after intervention. The sweets and beverages were strictly prohibited and it was advised by researcher nearly all the patients taking care in researchers advise. There were no charge observed in control group subjects. Before intervention, it was observed that the 31% were doing their diet restriction before two days. Before follow up whenever they were going to pathology for

testing blood glucose that was corrected by HbA-1C test after intervention as per guideline for diagnosis and follow up goal for control laid down by ADA. The control of DM II under goal of recent guidelines of ADA glycosylated haemoglobinHbA-1C 7% among 46% patients. The calculated value of chi-square it was found much more higher (18.0) as compared to table values (3.841) at one degree of freedom and 5 percent significant level. Therefore null hypothesis rejected and alternate hypothesis accepted that is patients were awared and taking diet as per recent trend laid down by ADA with prescribed drugs were good controlled type II diabetes. (Glycosylatedhaemoglobin less than 7%).

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