

## Life Style and Nutritional Profile of Non-Insulin Dependent Diabetes Mellitus (NIDDM) Patients

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### Abstract

The present investigation was undertaken to study the life style and nutritional profile of NIDDM patients. A representative group of 60 respondents belonging to different cities of punjab was selected. General information, dietary information, information about consumption of traditional food adjuncts like bittergourd, jamba and fenugreek seeds, diabetic history and activity pattern was collected. Height, weight and body mass index (BMI) were taken and food intake was recorded by 24 hour recall method. Fasting blood sugar (FBS) levels at the time of diagnosis of disease and prevailing ones at the time of survey were noted from reports of diagnostic laboratories. Observations showed that the majority of respondents were overweight and over 40 years of age with FBS levels of 200-300 mg/dl at the time of diagnosis. All respondents had general awareness regarding control of diabetes. Majority was consulting doctors, dieticians, was regular in walk and other exercises and was consuming glucose lowering food adjuncts. About 50% maintained fair to good control over diabetes. Data showed a definite decrease in their FBS levels. Mean daily intakes of energy and other essential nutrients except iron were adequate. Findings of study indicate that by modifying diet and life style one can maintain fair control over diabetes.

**Key Words: Fasting Blood Sugar, BMI, Obese, Traditional Food Adjuncts, Food Habits**

### Introduction

Diabetes mellitus is one of the most burdensome chronic diseases that are increasing in epidemic proportion throughout the world (*Mageshwari et al, 2004*). According to *WHO (2000)*, the global prevalence of non-insulin dependent diabetes mellitus (NIDDM) will more than double from 135 million in 1995 to 300 million by 2025. The largest number of diabetic subjects is in India (*Pradeepa et al, 2002*). Obesity and physical inactivity constitute part of the risk for NIDDM because of their propensity to induce insulin resistance. There is renewed interest in the prevention of insulin resistance and NIDDM through lifestyle interventions like physical activity and nutritional plan with reduced caloric intake (*Kelly, 2003*). Fiber rich foods and foods known to possess glucose lowering activity may be accorded some preference in the design of

diabetic diets. Since food and dietary pattern of an individual have an important role to play in the development, treatment or prevention of NIDDM, the present study focuses attention on food habits, consumption of traditional food adjuncts with glucose lowering activity, activity patterns and nutritional profile of selected NIDDM patients.

### Materials and Method

A group of 60 subjects, both male and female above the age of 30 years diagnosed clinically and chemically with NIDDM belonging to different cities of Punjab i.e. Jalandhar, Ludhiana and Patiala was selected. Information regarding the socio-personal and dietary profile of all selected subjects was collected through pre-tested questionnaire cum interview method. The relevant data on diabetic history of the subjects regarding awareness and control of

diabetes, consumption of traditional food adjuncts like bitter gourd, jambu and fenugreek seeds and activity patterns was noted. Anthropometric measurements of height, weight and BMI were taken using standard methods of *Jelliffe (1966)*. Food intake was recorded by “24 hour recall method” for three consecutive days and average daily intake of nutrients was calculated using standard food composition tables (*Gopalan et al, 1989*). Fasting blood glucose levels at the time of diagnosis of disease and prevailing ones were noted from the reports of clinical and diagnostic laboratories.

### Results and Discussion

The results revealed that 60 subjects (40 male and 20 female) selected for this study were in the age group of 30-60 years and majority was over 40 years of age and belonged to nuclear families with monthly income of more than Rs 10000. Food habits revealed that 48 per cent were lacto-vegetarian, 25 per cent ova-vegetarian and 27 per cent were non-vegetarian. None of the female subjects was non-vegetarian. Non-vegetarians consumed fish and chicken once weekly or fortnightly. None of them consumed mutton or pork.

Majority of the subjects had regular meal timings and did not nibble in between meals. Taste and nutrition were the major considerations for selecting food and cost did not matter. Majority did not skip meals or observe fasts and were eating out occasionally. A good number of subjects were consuming whole wheat and mixed flour, pulses, salads, skim milk and avoided sugar, alcohol and smoking. About one-third of the subjects used artificial sweetener in tea/coffee/milk and other sweet preparations like halwas and puddings. Almost all the subjects were

consuming Marie biscuits daily. Majority of the subjects (92 per cent) consumed bitter gourd as vegetable, juice or dry powder, 30 per cent consumed fenugreek seeds in different preparations and as such in soaked or powdered form and 20 per cent consumed dry jambu seed powder.

The data showed that all the subjects had general awareness regarding control of diabetes. About 50 per cent cases of diabetes were diagnosed in the age group of 35-45 years. *Sughanthi and Sardha (1991)* and *Snehalatha et al (2003)* have reported that prevalence of diabetes was higher after 40 years of age. Majority of the subjects had fasting blood glucose (FBG) levels in the range of 200-300 mg/dl and a few of them (8 per cent) had FBG level more than 400 mg/dl at the time of diagnosis of disease (Table 1) and all of them were put on medicine.

Table 1: Fasting blood glucose levels at the time of diagnosis

| Fasting blood glucose level (mg/dl) | Subjects (n=60) |            |
|-------------------------------------|-----------------|------------|
|                                     | Number          | Percentage |
| <200                                | 18              | 30         |
| 200-300                             | 28              | 47         |
| 300-400                             | 9               | 15         |
| >400                                | 5               | 8          |

A few of them discontinued medicine after sometime and they controlled diabetes by following other practices like walking, yoga and use of traditional food adjuncts while rest of the subjects (77 per cent) continued with oral hypoglycemic drugs. Majority of the subjects (58 per cent) had family history of diabetes with one or more family members suffering from diabetes. 65 per cent of the subjects were not suffering from any other disease whereas 35 per cent had cardiovascular disease. *Magheswari et al (2004)* and *Coulston (2004)* have reported cardiovascular

diseases to be the most prevalent form of complications among diabetics.

Activity patterns showed that all the subjects were leading sedentary lives but majority (72 per cent) were regular in their daily walk and some performed other exercises like yoga, jogging, cycling, swimming etc. A study by *American Diabetic Association (2004)* has demonstrated a consistent beneficial effect of regular physical activity training on carbohydrate metabolism and insulin sensitivity.

The anthropometric data showed that the average weight of both male and female subjects was more than ideal body weight (Table 2).

Table 2: Mean anthropometric measurements of NIDDM subjects

| Parameters                                    | Male (n=40) | Female (n=20) |
|---|-------------|---------------|
| Height (cm)                                   | 171.5±5.02  | 156.7±2.40    |
| Weight (kg)                                   | 80.05±7.44  | 68.9±9.04     |
| Ideal body weight* (kg)<br>(height in cm-100) | 72          | 57            |

\*Calculated using Broka's index

Majority of them fell in overweight/obesity category according to *WHO (2000)* classification of BMI (Table 3). *Vandam and Hujb (2001)* and *Radbard (2002)* have reported obesity to

be one of the major risk factors for the development of type II diabetes.

Table 3: Distribution of subjects according to WHO (2000) criteria of BMI

| Classification | BMI (kg/m <sup>2</sup> ) | Subjects(n=60) |            |
|----------------|--------------------------|----------------|------------|
|                |                          | Number         | Percentage |
| Under weight   | <18.5                    | --             | --         |
| Normal         | 18.5-22.9                | 9              | 15         |
| Over weight    | 23.0-24.9                | 17             | 28         |
| Obese grade I  | 25.0-29.9                | 10             | 17         |
| Obese grade II | ≥30.0                    | 24             | 40         |

Table 4 shows data on daily intake of different food groups by NIDDM subjects. Average intake of cereals, milk and milk products, fats and oils was more than the suggested intakes of *Raghuram et al (1993)* for diabetic subjects. Average intake of fruits was just adequate and that of vegetables was less than the suggested intakes. Average intake of pulses was less than the suggested intakes for female subjects. It was more than the suggested intake for both lacto-vegetarian and non-vegetarian male subjects and compensated for lower intake of meat and poultry for non-vegetarians. The consumption of sugar and jaggery was negligible as most of the subjects avoided it after the diagnosis of disease.

Table 4: Daily food intake by NIDDM subjects

| Food groups<br>g/day   | Female<br>(n=20) |                   |                   | Male (n=40)            |                   |                   |                       |                   |                   |
|------------------------|------------------|-------------------|-------------------|------------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|
|                        |                  |                   |                   | Lacto-vegetarian (n=9) |                   |                   | Non-vegetarian (n=31) |                   |                   |
|                        | Mean±S.D.        | Suggested intake* | Per cent adequacy | Mean±S.D.              | Suggested intake* | Per cent adequacy | Mean±S.D.             | Suggested intake* | Per cent adequacy |
| Cereals                | 193.3±12.2       | 150               | 128.8             | 260.0±18.1             | 225               | 115.5             | 285.0±20.8            | 250               | 114.0             |
| Pulses                 | 51.0±8.3         | 60                | 85.0              | 68.0±8.9               | 60                | 113.0             | 32.0±22.2             | 20                | 160.0             |
| Green leafy vegetables | 143.3±40.2       | 200               | 71.7              | 165.0±28.1             | 200               | 82.5              | 185.0±38.6            | 200               | 92.5              |
| Other vegetables       | 150.4±38.1       | 200               | 75.2              | 175.0±24.5             | 200               | 87.5              | 195.0±28.6            | 200               | 97.5              |
| Roots & tubers         | 110.0±30.0       | NA                | --                | 140.0±30.0             | NA                | --                | 130.0±14.0            | NA                | --                |
| Fruits                 | 94.0±8.4         | 100               | 94.0              | 112.5±18.0             | 100               | 112.5             | 98.0±15.1             | 100               | 98.0              |
| Milk and milk products | 397.5±28.3       | 300               | 132.3             | 485.0±72.4             | 300               | 161.0             | 198.5±34.1            | 150               | 132.3             |
| Fats and oils          | 22.5±4.54        | 10                | 225.0             | 23.5±7.0               | 15                | 156.6             | 32.7±8.4              | 20                | 163.5             |
| Meat and poultry       | --               | --                | --                | --                     | --                | --                | 43.8±33.3             | 70                | 62.5              |
| Sugar and jaggery      | --               | --                | --                | --                     | NA                | --                | 0.47±1.68             | NA                | --                |

\* *Raghuram et al (1993)*, NA-Data not available

Table 5 presents data on daily energy and nutrient intake by NIDDM subjects. Mean intakes of energy, carbohydrate, protein, total fat, dietary fibre, ascorbic acid and calcium were observed to be adequate while intakes of riboflavin and niacin were marginally inadequate. Mean intake of iron was inadequate for male subjects and grossly inadequate for female

subjects. Higher intake of energy from all the three sources i.e. carbohydrate, fat and protein could be one of the hindering factors in effective management of diabetes as *Sudha et al (2004)* have reported that the most effective dietary management for type II diabetes is caloric restriction for weight reduction.

Table 5: Daily nutrient intake of NIDDM subjects

| Nutrient          | Female (n=20) |       |                   | Male (n=40)            |       |                   |                       |       |                   |
|-------------------|---------------|-------|-------------------|------------------------|-------|-------------------|-----------------------|-------|-------------------|
|                   | Mean±S.D.     | RDA   | Per cent adequacy | Lacto-vegetarian (n=9) |       |                   | Non-vegetarian (n=31) |       |                   |
|                   |               |       |                   | Mean±S.D.              | RDA   | Per cent adequacy | Mean±S.D.             | RDA   | Per cent adequacy |
| Energy, Kcal      | 1413.0±74.6   | 1200* | 117.7             | 1834.4±89.6            | 1500* | 122.2             | 2020.0±101.2          | 1500* | 134.6             |
| CHO, g            | 220.0±20.8    | 189*  | 116.4             | 284.0±38.3             | 236*  | 120.3             | 310.0±42.8            | 236*  | 131.3             |
| Protein, g        | 62.0±17.4     | 48*   | 129.0             | 79.8±7.3               | 58*   | 137.5             | 87.0±12.8             | 58*   | 150.0             |
| Total fat, g      | 32.5±10       | 28*   | 116.0             | 41.6±3.7               | 36*   | 115.5             | 48.3±10.4             | 36*   | 134.0             |
| Dietary fibre, g  | 11.9±4.9      | 10*   | 119.0             | 13.8±3.0               | 10*   | 138.0             | 15.6±4.2              | 10*   | 156.0             |
| Ascorbic acid, mg | 118.0±15.8    | 40**  | 295.0             | 124.0±20.4             | 40**  | 310.0             | 134.8±14.8            | 40**  | 335.0             |
| Vitamin A, µg     | 1188±468.2    | 600** | 198.0             | 1308.7±425.6           | 600** | 218.1             | 1514.0±380            | 600** | 252.0             |
| Thiamine, mg      | 1.1±0.2       | 0.9** | 122.2             | 1.6±0.3                | 1.2** | 129.1             | 1.7±0.9               | 1.2** | 141.6             |
| Riboflavin, mg    | 0.95±0.2      | 1.1** | 86.4              | 1.2±0.3                | 1.4** | 85.0              | 1.4±0.3               | 1.4** | 96.4              |
| Niacin, mg        | 11.09±0.9     | 12**  | 92.4              | 12.8±1.9               | 16**  | 80.0              | 14.2±1.5              | 16**  | 88.75             |
| Iron, mg          | 11.8±2.7      | 30**  | 39.3              | 19.8±2.7               | 28**  | 70.7              | 22.4±3.4              | 28**  | 80.0              |
| Calcium, mg       | 901.2±66.7    | 400** | 225.3             | 1037.7±88.6            | 400** | 259.4             | 1198.0±90.8           | 400** | 299.5             |

\* Raghuram et al (1993), \*\* ICMR (1989)

Table 6 shows that 51 per cent of the subjects were maintaining fair to good control on their fasting blood glucose levels (< 130 mg/dl) while 49 per cent had fasting blood glucose levels higher than 130 mg/dl and had poor control on fasting blood glucose

Table 6: Current fasting blood glucose levels

| Fasting blood glucose levels (mg/dl) | Degree of control* | Subjects (n=60) |            |
|--------------------------------------|--------------------|-----------------|------------|
|                                      |                    | Number          | Percentage |
| <110                                 | Good               | 11              | 18         |
| 110-130                              | Fair               | 20              | 33         |
| >130                                 | Poor               | 29              | 49         |

\*Srilakshmi (2000)

When compared with fasting blood glucose levels at the time of

diagnosis of diabetes (Table 1) data showed a definite decrease in their fasting blood glucose levels.

### Conclusion

The study has revealed that rate of prevalence of diabetes is more among overweight/obese people and by modifying diet and lifestyle, doing exercise regularly and by consumption of traditional food adjuncts one can control diabetes without or with minimum dose of medicine. Diabetes is not curable; one has to live with it. Living with diabetes is like living with diabetic lifestyle. There is

urgent need to create awareness amongst the population for prevention of diabetes.

## References

- American Diabetes Association 2004. Physical Activity/Exercise and Diabetes. *Diabetes Care*, **27**: S58-S62.
- Coulston, A. M. 2004. Cardiovascular disease risk in women with diabetes needs attention. *Am. J. Clin. Nutr.*, **79**: 931-932.
- Gopalan, C., Ramasastri, B.V. and Balasubramaniam, S.C. 1989. Nutritive value of Indian foods, NIN, ICMR, Hyderabad.
- Jelliffe, D.B. 1986. The assessment of nutrition status of the community. World Health Organization Monograph Series No. 53, Geneva: 50-84.
- Kelly, D.E. 2003. Sugars and starch in the nutritional management of diabetes mellitus. *Am. J. Clin. Nutr.*, **78(8)**: 58S-64S.
- Mageshwari, U., Joseph, S. and Minitha, S. 2004. Pattern of cardiovascular complications among diabetics. *Ind. J. Nutr. Dietet.*, **41**: 507.
- Pradeepa, R., Deepa, R. and Mohan, V. 2002. Epidemiology of diabetes in India-current perspective and future projections. *J. Indian Med. Assoc.* **100**: 144-8.
- Radbard 2002. Treatment of type II diabetes. The American Association of Clinical Endocrinologists meeting, May 2002. *Diabetes Care.*, **25**: 1644-1649.
- Raghuram, T.C., Pasricha, S. and Sharma, R.D. 1993. Diet and diabetes. NIN, ICMR, Hyderabad.
- Snehalatha, C., Ramchandran, A., Kapur, A. and Vijay, V. 2003. Age-specific prevalence and risk association for impaired glucose tolerance in urban southern India population. *J. Assoc. Physicians India.*, **51**: 756-7.
- Srilakshmi, B. 2000. Dietetics. 3rd edition, New Age International Pvt. Ltd., New Delhi, p 196.
- Sudha, V., Radhika, G. and Mohan, V. 2004. Current dietary trends in the management of diabetes. *Ind. J. Med. Res.*, **120**: 4-8.
- Suganthi, S. and Sardha, V. 1991. Prevalence of hypertension in diabetes mellitus and impact of diet counseling. *Ind. J. Nutr. Dietet.*, **28**: 238-242.
- Vandam, R. M. and Hujb 2001. Diet and risk of type II diabetes: the role of types of fat and carbohydrate. *Diabetologia.*, **44**: 805-817.
- WHO (World Health Organization) 2000. The Asia-Pacific perspective redefining obesity and its treatment. International Diabetes Institute. Health Communications Australia Pvt. Ltd. Geneva. levels.