Editorial

Prevalence of Diabetes and its Non-Pharmacological Management

Prof. Dr. Azhar Masud Bhatti
Editor-in-Chief

In 1993, the World Health Organization (WHO) Diabetes Reporting Group published standardized global estimates for the prevalence of diabetes and impaired glucose tolerance in adults, based on data from 75 communities in 32 countries[1].

In a study, data from the global database collected by WHO with demographic estimates and projections issued by the United Nations to estimate the number of people with diabetes in all countries of the world for three points in time, i.e., the years 1995, 2000, and 2025. In addition, the data have been analyzed in terms of certain additional parameters, such as sex ratio, urban-rural ratio, and the age structure of the diabetic population.

In accordance with United Nations convention, Europe, North America, Australia, New Zealand, and Japan were considered "developed" countries, with all other countries designated as "developing" countries. For regional groupings, the aggregations proposed by the World Development Report 1993 were adopted[2].

However, for developing countries, rural and urban areas were considered separately, since prevalence is known to differ markedly with differences in diet, physical exercise, and other socioeconomic factors. Estimates for present and future urbanization patterns are also available from the United Nations Population Division[3,4].

For China, data from the 1994 National Diabetes Survey of 250,000 subjects in 16 provinces were aggregated into rural and urban estimates. For the U.K., two surveys were combined. For the U.S., National Health and Nutrition Examination Survey II data were used for ages 20-74 years.

Prevalence of diabetes in adults worldwide was estimated to be 4.0% in 1995 and to rise to 5.4% by the year 2025. It is higher in developed than in developing countries. The number of adults with diabetes in the world will rise from 135 million in 1995 to 300 million in the year 2025. The major part of this increase will occur in developing countries.

There will be a 42% increase, from 51 to 72 million, in the developed countries and a 170% increase, from 84 to 228 million, in the developing countries. Thus, by the year 2025, >75% of people with diabetes will reside in developing countries, as compared with 62% in 1995. The countries with the largest number of people with diabetes are, and will be in the year 2025, India, China, and the U.S. In developing countries, the majority of people with diabetes are in the age range of 45-64 years. In the developed countries, the majority of people with diabetes are aged >65 years. This pattern will be accentuated by the year 2025. There are more women than men with diabetes, especially in developed countries. In the future, diabetes will be increasingly concentrated in urban areas.

The "Top 10" countries of the world, in terms of the number of people with diabetes, are shown for 1995 and 2025 in Table 1. At both points in time, the three countries with the largest number of people with diabetes are India, China, and the U.S. For 1995, others in the Top 10 are the Russian Federation, Japan, Brazil, Indonesia, Pakistan, Mexico, and the Ukraine. For 2025, the others in the Top 10 are Pakistan, Indonesia, Russian Federation, Mexico, Brazil, Egypt, and Japan. Thus, there will be a tendency for certain developing countries to move up the list and for certain industrialized countries to move down it. In both time periods, the Top 10 countries will account for approximately two-thirds of all diabetes in the world.

Some recent reports have suggested quite substantial increases in prevalences in countries such as India[5] and Korea[6]. A recent report from Nigeria[7].

Table No. 1: Top ten countries for estimated number of adults with diabetes, 1995 and 2025

	Country	1995 (million)	Country	2025 (millions)
Rank				
1	India	19.4	India	57.2
2	China	16.0	China	37.6
3	U.S.	13.9	U.S.	21.9
4	Russian Federation	8.9	Pakistan	14.5
5	Japan	6.3	Indonesia	12.4
6	Brazil	4.9	Russian Federation	12.2
7	Indonesia	4.5	Mexico	11.7
8	Pakistan	4.3	Brazil	11.6
9	Mexico	3.8	Egypt	8.8
10	Ukraine	3.6	Japan	8.5
All other countries		49.7		103.6
Total		135.3		300.0

The database is a contribution to an ongoing process of worldwide surveillance of diabetes, its complications, and related disorders, which recently led the WHO to recommend prevalence of diabetes as one of the "basic health indicators" for its member states[8]. Such surveillance is a first step toward the integrated prevention and control of diabetes and other non-communicable diseases, which is now recognized as an urgent priority for national and international health authorities[9].

Non pharmacological interventions have a much greater role in the management of non-insulin dependent diabetes mellitus (NIDDM) as compared to the management of insulin dependent diabetes mellitus (IDDM) and every effort should be made to manage NIDDM by non-pharmacological means before restoring the use of drugs.

DIET: Is an integral part of the management of both NIDDM and IDDM.

EXERCISE: Should be considered and integral part of the management of NIDDM. However, IDDM patients who wish to exercise must be given proper guidance.

STRESS MANAGEMENT: Must be an integral part of management of NIDDM if glycemic control is to be attained. However, stress management will also improve the quality of life for individual with IDDM or NIDDM.

GOALS FOR DIETRY MANAGEMENT OF DIABETES:

1. Maintain adequate nutrient intake for growth, other psychological needs and/or maintain ideal body weight.
2. Maintain blood glucose as near normal as possible to prevent hyper and/or hypoglycemia and to maintain optimal blood lipid levels so as to prevent or delay the development of long term cardiovascular, renal, retinal and neurologic complications associated with diabetes.
3. Stay consistent in timings of meals and snacks to prevent swings in blood glucose levels for the people on insulin therapy.
4. Determine the meal plan appropriate for the individual's life style, based on diet history.
5. Manage weight for obese people with NIDDM. Weight management involves specific changes in food related behavior and eating patterns as well as increased activity level. Continued support and follow-up by health professionals are needed if long term life style changes to be made.

DIET RECOMMENDATIONS:

CALORIES: Calories should be prescribed to achieve and maintain a desirable body weight. To determine calorie level to prescribe for patients with NIDDM, multiply present body weight in pounds by 13 and minus 500-1000 calories depending on the individual patients readiness and ability to cut down on food intake and the amount of weight to be lost. In no case should the intake be less than 1000 calories for females and 1200 calories for males.

CARBOHYDERATES:

1) 60% of the calories can come from carbohydrates thus a 1000 calories diet may contain upto 150 g CHO. The amount of carbohydrates must be individualized depending on blood glucose and lipid levels as well as eating patterns.
2) Whatever acceptable substitute unrefined carbohydrates with fiber for refined carbohydrates e.g. "Atta" instead of "Maida".

PROTEIN: The recommended intake of protein is 0.8 g/kg of body weight for adults. For Pakistanis that works out to be about 45g for females and 55g for males. Plant and fish protein should be used in addition to other animal protein sources such as meat, milk and egg. High protein intake should be avoided. There is growing evidence that lower protein intakes delay the progression of renal disease.

FAT & CHOLESTROL: Total fat intake ≤ 30% of calories. For 1000 kcal this equals approximately 33g fat or 6-7 teaspoons fat. Since foods such as meat, milk and nuts also contain fats, the amount of cooking fat allowed on a 1000 kcal diet will depend on how much these foods are used.

Saturated Fats 1/3 of fat intake

PUFA 1/3 of fat intakes

Cholesterol ≤ 300 mg/day. 1 oz meat 23 mg.

SALT: Recommended 1 g/1000 kcal. One teaspoon salt 5000mg NaCl or 2300 mg Na.

FIBER: Recommendation 40 g/day	Foods high in fiber:	
Beans (Lobia & Cholla)	½ cup cooked	6g
Dals	½ cup cooked	3.5-4g
Fruits & Vegetables	1 or ½ cups	1.5-2g
Unrefined cereals and grains	1 serving	1.5-2g

ALTERNATIVE SWEETENERS: The use of various nutritive (e.g. aspartame) and non-nutritive sweeteners (e.g. saccharin) is acceptable in the management of diabetes.

EXERCISE

NON_INSULIN DEPENDENT DIABETES

An appropriate exercise program should be an integral part of the management program along with diet and/or drug therapy, to improve glycemic control, reduce certain cardiovascular risk factors and increase psychological well-being in individuals with NIDDM. The benefits of exercise out-weigh the risks; however attention must be paid to minimize potential exercise related complications.

INSULIN DEPENDENT DIABETES

Exercise programs have not clearly shown to improve long-term glycemic control in people with IDDM. However, people with IDDM should be encouraged to exercise in order to improve cardiovascular fitness and psychological well-being.

RISKS OF PHYSICAL EXERCISE IN IDDM: Hypoglycemia, hyperglycemia, ketosis, cardiovascular ischemia and arrhythmia, exacerbation of proliferative retinopathy and lower extremity injuries. Many variables affect the metabolic response to exercise therefore the health profession must take into consideration the following factors when counseling insulin dependent diabetes exercise.

Table No.2: Exercise Recommended for Patients with NIDDM

Screening	Search for vascular and neurological complications including silent ischemic heart disease. Stress Electrocardiogram in patients > 35 years of age may be required.
Exercise Program	
Type	Aerobic
Intensity	50 – 70% of maximum aerobic capacity
Duration	20 – 60 minutes
Frequency	3 – 5 times /week
Avoid complication	Warm up and cool down Careful selection of exercise type and intensity Patient education Monitoring of blood glucose by patient and overall program by medical personnel
Compliance	Make exercise enjoyable Convenient location Positive feed back from involved medical personnel and family

Consideration before Exercise for Individuals with IDDM

Type of exercise:

Estimated intensity and duration of exercise

Estimated caloric expenditure

Is the exercise habitual or unusual?

How does the exercise relate to the level of physical conditioning?

Blood Glucose:

If < 100 mg/dl, take pre-exercise snack

If 100 – 250 mg/dl, all right to exercise

If > 250 mg/dl, delay exercise, check urine ketones

Urine Ketones: If negative, all right to exercise. If positive, take insulin don't exercise until ketones are negative

Insulin: Type and dose, time of injection, site of injection

Food: Time of last meal, Pre-exercise snack, Carbohydrate feedings during exercise, Extra food after exercise

Strategies to Avoid Hypo or Hyperglycemia with Exercise:

Food: Eat a meal 1 – 3 hours before exercise. Take supplemental carbohydrate feedings during exercise, at least every 30 minutes if exercise is vigorous and of long duration. Increase food intake ≤ 24 hours after exercise, depending on intensity & duration of exercise

Insulin: Take insulin > 1 hour before exercise. Decrease insulin dose before exercise. After daily insulin schedule

Blood Glucose Monitoring: Monitor blood glucose before, during and after exercise. Delay exercise if blood glucose is > 250 mg/dl and ketones are present. Learn individual glucose response to different types of exercise

STRESS: There is mounting experimental evidence of altered sympathetic nervous system activity in NIDDM as evidenced by a hyper-responsiveness to epinephrine resulting in an exaggerated suppression of insulin secretion and profound hyperglycemia. It has also been reported that glycemia control is improved in individual with NIDDM when they are trained in relaxation techniques. Thus the health professional must take into account the life experiences of the patient with NIDDM and be in a position to provide support and guidance in ways to reduce stress in the individual's life or refer the patient to an appropriate source of help. Stress management should be seen as an adjunct to diet and exercise in the non-pharmacological management of diabetes aimed at improving both glycemic control and the quality of life of the individual with NIDDM.

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