

*Living The Sweet Life
with Diabetes*



Santosh Gupta MD



Treatment of a Child with diabetes in Haridwar



Children with Diabetes in Haridwar on 'World Diabetes Day'

Living the sweet life with Diabetes
The Art of balancing insulin, diet and exercise

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Foreword

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Foreword

Living the Sweet Life with Diabetes” is a much-needed simple booklet aimed at children with type 1 diabetes (T1D) and their family members. T1D is becoming increasingly common, and unlike other conditions, takes an enormous toll on the child, the family, and the health care team. It needs a well-informed doctor (ideally a pediatric endocrinologist) and core team, ideally of diabetes educator, dietician, and psychologist, supported by other specialists, and helped by society at large. What happens in a vast country like India is that while some children from educated, sensible, well off families, get the best care comparable to anywhere in the world, many others have to struggle with poorly informed health care teams, difficulty in getting insulin with no breaks in the cold chain, difficulty in affording the expensive routine diabetes care, discrimination inside and outside the family, and thus an unnecessarily hard and painful life. In these circumstances, the affected child and family have to learn to be “diabetologists” themselves and manage the condition with minimal medical help.

Dr Santosh Gupta encountered a situation where children were dying soon after diagnosis of diabetes, and with her expertise and tenacity, changed it to one where today 120 children are growing up happily to become normal, productive adults. She ensured that as many as possible diabetes educators were trained (before circumstances stopped the program) to continue the good work for more children as they are diagnosed.

She realized the need to provide the crucial information to the families, so they can remind themselves how to do things, and perhaps also, when needed, show the booklet to a doctor or nurse who may not be so knowledgeable!

The book is written in a simple to understand, question answer style, which addresses the questions all children with diabetes and their families would need to ask. It demystifies a complex problem and allows the families themselves to handle the diabetes well, whether on a routine basis or during a crisis. It spells out carb counting in the Indian context, and explains calculations for carb content as well as correction, so that the child no longer has to struggle with sugar swings without any idea what to do about it.

Equally important is the Hindi translation of the booklet, which makes it accessible to families not able to understand English well. These are the people who need it the most, as they would typically be poorer, in remoter areas, and least able to access information on the Net and elsewhere. Dr Gupta and her supportive family are to be congratulated for their hard work in this noble cause.

– Dr. Anju Virmani

Preface

Severe complications and early death from Type 1 Diabetes (T1D) can be prevented by treating patients with the concept of “Multiple Dose Injection” (MDI) of insulin as described in the introduction of this book. To implement MDI, “Diabetes Self-Management Education” (DSME) to the patient and family by a well-trained Certified Diabetes Educator (CDE) is essential where patient take the responsibility of managing their own diabetes. Physicians are responsible for diagnosis, medication, and of managing complications. Diabetes Educator (CDE) is an important link between patient and physician and provides comprehensive education as described below.

A Diabetes Educator should first have basic knowledge of all aspects of diabetes care. The education should be patient centered. Therefore, it should be a dialogue between the patient and the educator in the form of questions/answers. The educator needs to connect with the patient to earn their trust. The next step is to find out what are the most important things in a patient’s life, and then teach accordingly for their literacy level and social situation. The educator needs to assess the patient’s motivation level, and accordingly adjust their interventions to inspire positive motivation. It is important to set realistic and achievable goals so that the patient can build on certain milestones during the programme. Role playing techniques are very effective in engaging patients and increasing their understanding.

This book is written keeping in mind the question-and-answer pedagogy and, therefore, is an effective resource for teaching and learning.

I am a Pediatric Endocrinologist and an Associate Professor at Washington University in St. Louis, USA. I am also a CDE (USA) with a long-term interest in diabetes education. In 2005, I visited a multi-specialty charitable hospital in Northern India – Rama Krishna Mission Hospital – at Haridwar. I found that no child T1D had ever survived at this hospital beyond a short time. I discovered that the treatment for T1D was antiquated, as physicians were using two fixed doses of pre-mixed insulin, a fixed diet, and minimal monitoring of blood sugar. Moreover, the carbohydrate (CHO) count of an Indian diet was not available to patients.

I took the daunting challenge in 2006 to introduce MDI in three T1D patients at RKM in Haridwar. I studied the life style of these three patients and designed a culturally appropriate DSME for them. For the next ten years, I spent many months of each year in India. I constantly modified DSME, wrote a manual for patients and compiled a CHO count of the common Indian diet. I trained a local diabetes educator and a local physician. By 2016, we had 120 T1D children in our program who were living a normal life without complications. We published our results in the *Journal of Diabetology* (please see reference 1, page 55).

We provided these children and their families with free insulin and everything else that they needed to monitor blood glucose. Initially my foundation (Manav Seva

Foundation) provided financial support for these patients. Subsequent support came through a grant from International Diabetes Foundation (IDF) and Insulin for Life (IFL) USA. Washington University in St. Louis collaborated by sending their residents in training to work at Haridwar in our program.

In 2012, I started a “Certified Diabetes Educator, India” (CDEI) program at RKM Nursing School in Vrindaban. It was a one-year course and all the candidates were graduate nurses. The curriculum was based on that of the American Association of Diabetes Educators and IDF but modified for the Indian environment. I trained a highly qualified physician with a post-graduate degree to run the program. I also trained my CDEI to be an Instructor at Vrindaban. I was regularly giving online classes and physically giving seminars in-person. I wrote and conducted a final exam for the candidates consisting both of multiple-choice questions and a practical element using actual patients. Our CDEI course has received recognition by the International Diabetes Federation.

In 2016, I decided to hand over the program to the administration of RKM Haridwar, who would continue the program with the team that I had trained. The funding from IDF unfortunately stopped in 2016 as it was dependent on my involvement, but I am happy to say that RKM now has adequate resources to be self-sustaining. In 2016, IDF closed their education wing and, as a result, our CDEI program recognition was discontinued. Without a creditable recognition, the value of the

certificate diminished. Therefore, it became difficult to attract candidates for the next round. With all that said, my CDEI graduates are continuing to make a difference and to save lives in the places that they are working now.

1 June 2018

– Dr.Santosh Gupta

Introduction

Diabetes is a disease of high blood glucose (sugar). All food, especially carbohydrates, gets converted into glucose in the blood. Blood glucose stimulates the release of an appropriate amount of insulin from Beta cells in the pancreas to maintain blood glucose levels between 80 to 120 mg% and A1C less than 5.7%. Insulin acts as a conduit that allows the cells in the body to take in glucose and use it as energy. If insulin is not produced by the pancreas, Type 1 Diabetes (T1D) develops. If body cells cannot effectively use insulin to utilize glucose (called insulin resistance), Type 2 Diabetes (T2D) develops.

T1D affects children and young adults and is the result of an autoimmune process that destroys insulin-producing beta cells in the pancreas and it has a sudden onset. These patients will need insulin for immediate therapy and for the remainder of their lives. Without insulin, T1D patients develop ketoacidosis and fall into a coma, often leading to death. In the long run if T1D is not well controlled, patients will develop microvascular (involving small blood vessel) complications affecting the kidneys, the eyes and the nervous system. A Diabetes Control and Complication Trial (DCCT) published in 1993 [Reference 3, page 55] proved that complications in T1D are directly proportional to the control of diabetes (A1C). A normal and healthy life is possible by maintaining a desirable level of A1C.

Type 2 Diabetes occurs in adults. In these cases,

initially pancreas produces enough insulin but due to insulin resistance, the blood glucose level is high. Over the years, the functioning of the beta cells in the pancreas also starts to decrease, resulting in reduced insulin production. T2D may run in families and is often related to lifestyle changes such as obesity and lack of regular exercise. It can go unnoticed and undiagnosed for years. These patients can often be managed with a proper diet and oral medicines but may eventually need insulin. Association of T2D with cardiovascular risk factors (high blood pressure, high cholesterol and smoking) will often result in developing macrovascular complications (large blood vessels) such as heart attack, stroke and poor circulation in legs. Control of risk factors is extremely important to prevent complications in T2D.

Blood glucose levels change after meals and after physical activity or stress, therefore insulin must be taken multiple times a day to match the changes in blood glucose levels. This schedule is called Multiple Dose Insulin injections (MDI). There is a formula to calculate the insulin dosage based on blood glucose levels, carbohydrate (CHO) count in the diet, activity level, and other factors. Diabetes Self-Management Education (DSME) empowers both patients and their families with knowledge on how to calculate the appropriate dosage of insulin for their lifestyle. DSME is provided by professionally trained and certified Diabetes Educators. The following quote by Prof. George Alberti, past President, International Diabetes Federation, best describes the critical importance of DSME, and full participation of pa-

tients in managing their own diabetes:

Person who can properly manage the diabetes is the person who lives with it day by day, month by month, year by year. It is the role of health care professionals to equip the patient and often their family with the tools and education to do this.

This book is a practical guide on how to teach DSME, particularly in the Indian context. It is written for patients and their families, and for diabetes educators. It is comprehensive and provides answers to the management of T1D, especially in under-resourced areas. It has a list of the carbohydrate counts of common Indian foods and is presented in simple language along with cartoons that children can understand.

June 1, 2018

– Dr. Santosh Gupta

Type-1 Diabetes

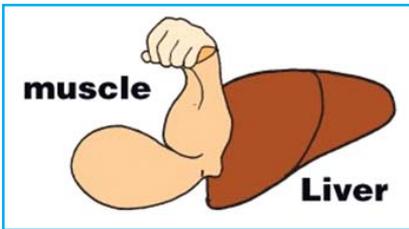
Answers to Children's questions about diabetes :

What is diabetes?

Diabetes occurs when there is too much sugar in your blood and not enough insulin.

Why do my family and I need to learn about diabetes?

Diabetes is a lifelong disease. Diabetes is with you 24 hours a day. Like your regular need for food, type one diabetes also requires daily attention. Learn about diabetes now so that as an adult you can take charge of your own diabetes and make healthy decisions for yourself.



Where does the sugar in blood come from?

Sugar comes from two sources:

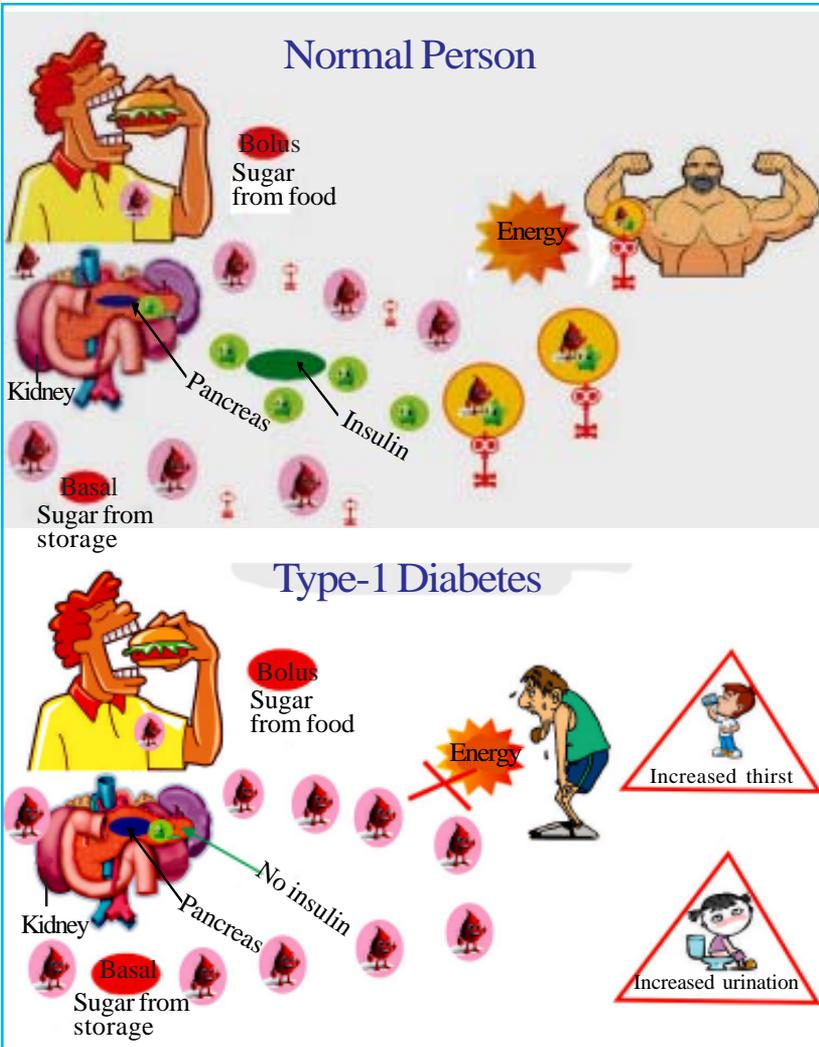
1. Internal Sugar comes from liver, muscle and fat stores in your body. This is called basal sugar.
2. External sugar comes from food that you eat. Food enters the blood stream and is called glucose. This is called bolus sugar.

What is insulin ?

Insulin is a hormone produced by a gland in your body called the pancreas.

What does insulin do ?

Insulin is like a key that allows food to enter your body cells to produce energy for daily living, just as the



key to a car allows fuel to run the motor.

What happens in your body when you have diabetes?

Without insulin from your pancreas, sugar from food cannot enter your body cells to produce energy. Sugar builds up in your blood causing diabetes.

How does high blood sugar hurt you?

When sugar builds up in your blood because the insulin “key” is not available to carry the sugar into your cells, you feel weak and hungry, and lose weight. Your kidneys try to get rid of the high blood sugar through urine, so you go to the bathroom often. With too much urination, you feel thirsty all the time. Lack of insulin results in formation of ketones from the fat stores in your body. Build-up of ketones in the blood causes a stomach ache, vomiting, difficulty breathing and feeling sleepy and tired. If not treated in time with insulin, this build-up of sugar and ketones can result in a coma and even death.

How do you know you have diabetes?

- Excessive thirst
- Excessive Urination
- Sticky Urine
- Excessive Hunger
- Weight loss
- Extreme weakness

Any child with these symptoms should see a doctor and get a blood test immediately.

Are there different types of diabetes?

There are three main types of diabetes.

Type-1 diabetes

- Usually occurs in children
- The cause is unknown
- It is like an accident
- It is not catching
- It is not caused by eating too much sugar
- Children with type one diabetes are normal
- When a child's pancreas stops making insulin, he or she will need insulin injections for life.

Type-2 diabetes

- Usually occurs in adults
- May be treated with tablets of Oral Hypoglycemic Agent (OHA) at first but may need insulin injections when the tablets stop working.

Gestational Diabetes

Diabetes that occurs for the first time during pregnancy and usually disappears after the birth of the baby. However both the mother and the child are at a greater risk of developing type 2 diabetes in their life.

Treatment of Type 1 Diabetes

What is the treatment for childhood diabetes?



Remember that there are two sources of sugar. You need to control both sources of sugar with two different types of insulin.

Insulin Therapy

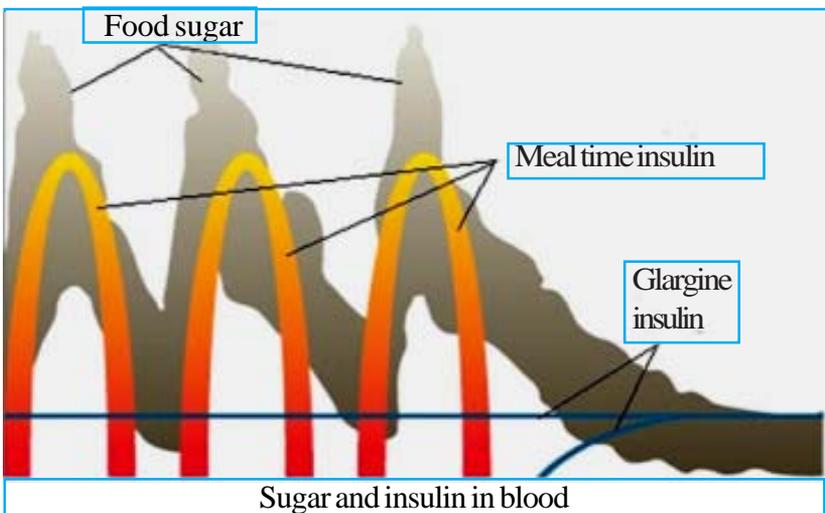
Children with diabetes generally require 0.75 units/Kg/day of total insulin. 40% of the total daily dose is given as basal dose using Glargine insulin. Meal time insulin is calculated based on the carbohydrate content of your meal and your premeal blood sugar and adjusted for exercise.

Internal sugar comes from your body stores and accounts for 60 % of the total sugar in your blood. This internal sugar is controlled by injecting an insulin called Glargine. Usually you will inject this insulin every night before bedtime. It has no relationship to the time of your evening meal.

This bed-time Glargine insulin dose is adjusted according to the results of the morning fasting blood sugar test. If the fasting blood sugar is too high, then the next night's dose of Glargine insulin is increased. If the fasting sugar is too low, then the dose of Glargine insulin is decreased the next night. How much to increase or decrease your dose of Glargine insulin is determined by your doctor.

External sugar comes from the food you eat for breakfast, lunch, dinner and snacks. It is desirable that children with diabetes eat three good meals as well as three snacks daily. Eat one snack between breakfast and lunch, the second one between lunch and dinner and the third one at bedtime.

To control external sugar, we use short acting insulin called Insugen-R. This insulin is taken 30 minutes before a meal, and it lasts for five to six hours. Other meal time insulin, called ultra-short insulin, is taken 15



minutes before a meal and its action lasts for four hours. Ultra-short insulin is more expensive. It is known by names such as insulin Aspart, Lispro, and Glulisine.

When a snack is big you may need an additional injection of Insugen-R or Wosulin-R insulin.

Insulin to Carb Ratio

The dose of your meal time insulin depends on how much food you are eating and what your blood sugar level is before a meal. For more food you need more insulin, and for less food you need less insulin. Your doctor will tell you how much insulin you need for the carbohydrates in a meal such as bread (roti), lentils (dal) and rice. This is calculated by first determining your total daily dose (TDD) based on your weight and then dividing 500 by TDD. This is called Insulin to Carb ratio. (I/C ratio).

Extra insulin is needed to bring a high blood sugar before your meal to normal. Your doctor will determine how much extra insulin needs to be added to your meal time insulin. Similarly, if your blood sugar before the meal is low, your doctor will tell you how much insulin is subtracted from your regular meal time dose of insulin. The extra insulin is calculated by dividing 1500 by TDD of insulin. This is also called Sensitivity factor(S/F).

Example: Your doctor tells you your insulin to carbohydrate ratio is 1/15 which means you need one unit of insulin for each 15 grams of carbohydrate.

You plan to eat:

Example: One bowl of lentil (dal) containing 30

grams of carbohydrate, and three breads (Roties) contain 90 grams of carbohydrate. The total carbohydrate for your meal is 120 grams.

Now divide 120 grams of carbohydrate by the ratio denominator of 15 which your doctor has calculated.

Your meal dose is now 8 units of insulin to cover the carbohydrates in your meal.

Setting a goal for your premeal sugar level: Next your doctor will determine what blood sugar level is good for you before every meal. For example, say it is 80-150 mg %. Which means that you will need extra insulin added to your meal dose if your blood sugar before meal is more than 150mg%. If your blood sugar is less than 80 you will subtract some insulin from your total meal dose.

Extra Insulin or sensitivity factor: Say your doctor has calculated your extra insulin factor to be 1 unit for every 50 points over 150 mg % of premeal sugar.

Example: If your pre-meal blood sugar is 151-200 mg, you need 1 extra unit added to your above meal dose of insulin $8+1=9$ units

- For a blood sugar of 201-250 mg, add 2 extra units of insulin= 10
- For a blood sugar of 251-300 mg, add 3 extra units of insulin= 11 .

Similarly, you will be instructed to reduce 1-2 units of insulin from your meal dose if your blood sugar is 80 mg or less before meal time.

Caution: Remember the I/C ratio and S/F will change from meal to meal. Your diabetes educator or

your doctor will train you further.

Calculation of all the insulin doses and changes should be done by a physician familiar with principals of MDI treatment, taught and reinforced by a qualified diabetes nurse educator.

How long does one injection of insulin last in your body?

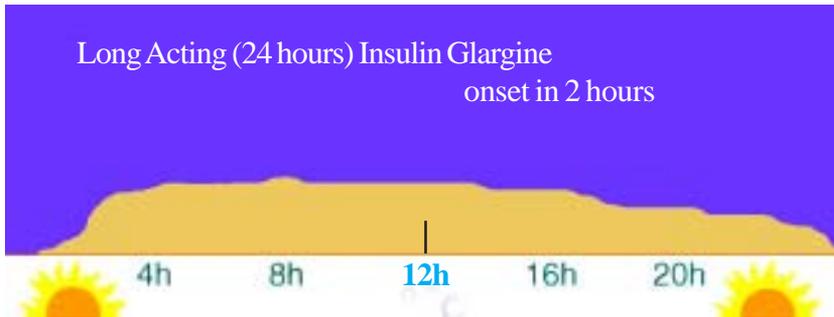
The following graphs show the peak action (when insulin is working at its best) and the duration of various types of insulin.

Types of Insulin

Insulin is available in following types:

Glargine Insulin

Glargine (Basal insulin) lasts for 24 hours. It has no peak and is usually taken at bed time. It has no relation-

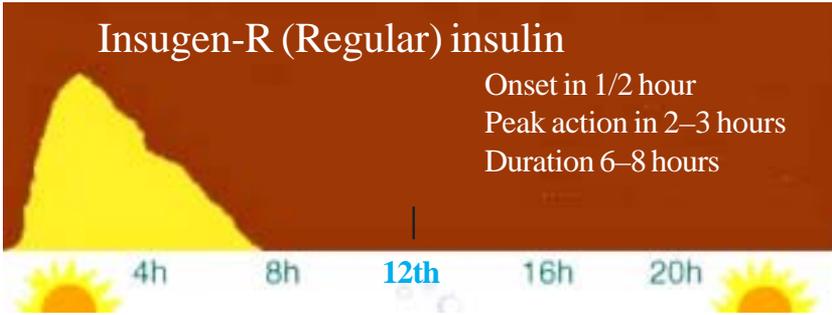


ship to meal times. It cannot be mixed with any other insulin in the same syringe.

Insugen-R (Regular) Insulin

This is a meal time insulin. It begins to work in 30 minutes, therefore it should be taken a half hour before your meal. Its effect lasts for six hours. In general, regu-

lar insulin dose should not be repeated any sooner than every 6 hours. This can result in hypoglycemia from too much insulin in your blood caused by two doses overlapping.



Ultra-Short insulin (Aspart, Lispro, and Glulisine)

Should be taken 15 minutes before a meal. Its effect lasts for four hours. It should not be repeated before 4 hrs.



NPH insulin is called intermediate insulin

It appears cloudy in the vial. It can be used as a basal insulin to control internal sugar when divided in two doses given every 12 hrs. It can be combined with regular insulin in the same syringe as needed. It begins to work in two to four hours. Its peak action is at eight to ten hours. The duration of action can be 12-24 hours.

Intermediate Acting Insulin (NPH)

Onset in 2 hours
Peak action in 8–10 hours
Duration 12–24 hours



What are the delivery options ?

A diabetes educator will train you in the correct technique for administering your insulin.

1. Glass vial: You fill your syringe with the proper dose of insulin from the vial and inject the insulin just under your skin with a very small needle.

2. Pre-filled disposable pen: You attach a pen needle, then by moving a knob at the other end, you can dial the required dose of insulin and inject it through the pen needle under your skin. You may need to discard few drops to fill the space in the needle. This called priming the pen.

3. Pre-filled glass cartridges: The cartridges are loaded in a re-usable pen.

4. Insulin pump: This small device, the size of a pager, is worn on your belt. A small tube, with one end attached to the



Insulin Pump

pump and the other end inserted into your belly, has a reservoir that is filled with ultra-short insulin. A built-in computer calculates the dose of insulin for the amount of food you are eating plus any additional insulin to cover your pre-meal blood sugar and delivers the desired dose through the tubing when you push a button. This is an expensive option.

Storage of Insulin:

- The individual manufacturer's storage recommendations and expiration dates must be adhered to. These usually suggest that:

- Insulin must never be frozen

- Direct sunlight or warming (in hot climates) damages insulin

- Unused insulin should be stored in a refrigerator (2–8°C)

- After opening, an insulin vial it is good for 28days if kept at room temperature and longer if kept in the refrigerator.

- If you are using a pen, it does not need to be refrigerated. You may carry the pen in your school bag or hand bag, provided the bag is kept in a cool place.

- If you do not have a refrigerator, insulin may be kept in a double clay pot. The outer pot is filled with cold water which is changed every time the water gets warm. The insulin vial stays in the inner pot which keeps it cool.

Insulin Regimes

What is a good insulin regimen for children?

Here are some of the possible insulin regimens:

1. Glargine insulin at bed time and regular insulin before each meal. Total of four injections/day. This is an expensive option but gives the best control. This gives flexibility and protects against night time hypoglycemia.

2. Three injections of lesser amounts of intermediate insulin (NPH) every eight hours as a basal plus an injection of regular insulin before each meal based on carbohydrate count. This is a less expensive option than glargine.

3. Two injections of intermediate insulin (NPH) every 12 hrs. as a basal and three injections of regular insulin before each meal based on carbohydrate count. This will be a total of three injections.

4. Split Mix: Two injections of intermediate insulin (NPH) with regular insulin in varying combinations, based on the blood sugar is sometimes used. This option is harder to learn, requires constant attention and allows no flexibility in meal times.

5. Two injections of pre-mixed insulin (70% intermediate insulin (NPH) mixed with 30% regular insulin) are still used in many parts of the world for convenience and cheaper cost. With this option, it is hard to get good control of blood sugar and hypoglycemia is a big problem.

Your doctor will discuss options and help you decide which is the best regimen is for you.

Dietary Management of Type 1 Diabetes

What is a good diet for a child with diabetes?

A diet for children with diabetes must provide:

- Enough calories to promote growth
- A balance of carbohydrates, protein, fats, fruits and vegetables
- Foods that maintain blood sugar at or near normal
- Foods that maintain optimal blood lipid levels
- Foods that the whole family can eat

Calories

Children up to age 16 yrs., need 1000 Kcal + (age in years x100 Kcal) = calories per day. A 5-year-old. will need 1000 Kcal + 500 Kcal = 1500 calories each day
10-year-old. will need 1000 Kcal + 1000Kcal = 2000 calories each day. Extra calories should be added for moderate to heavy exercise.

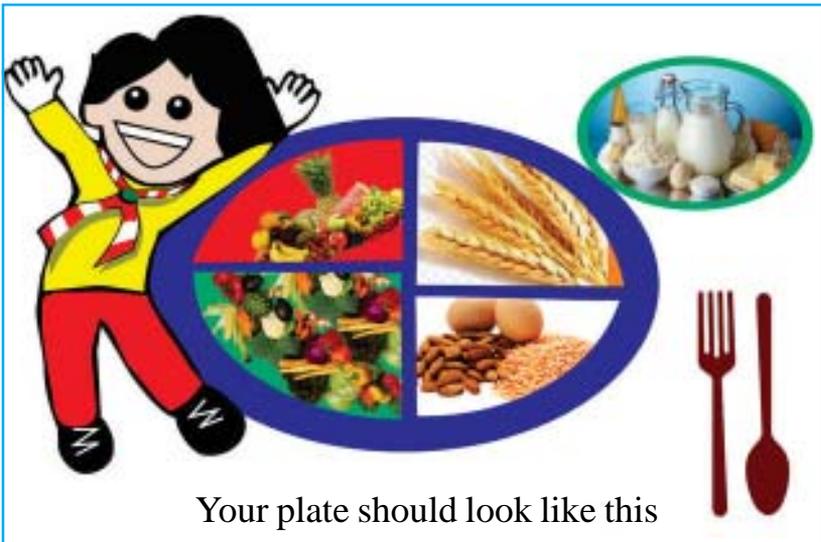
Carbohydrates

Food is made up of carbohydrates, proteins, fats, vitamins and minerals which are necessary for health. Carbohydrates (CHO) are found mainly in grains, with some CHO in fruits and a small amount in vegetables and milk. Carbohydrates cause blood sugar to rise immediately, while protein and fats affect blood sugar slowly over several hours. CHO counting is not a diet. It is a way of planning your CHO intake to manage your blood sugar level, avoiding high blood sugar. Eating the same amount of CHO for your meals and snacks every day

insures better blood glucose control. Learning CHO counting allows you to have variety and flexibility in your diet, and most importantly, it allows you to follow your individual eating style. By counting the CHO in your meals, you can then calculate the dose of insulin needed to maintain your blood sugar in a desired range. By keeping your blood sugar in a good range, you can prevent the complications of diabetes.

Balanced Diet:

Balanced Diet: In a balanced diet, 50%-60% of your calories come from carbohydrates, 25% from proteins



and 15-25 % from fats. In addition, you need four helpings of vegetables a day and at least two fruits. For a diabetic it is best to choose foods that are low in carbohydrate and not very high in calories.

Indian Diet:

You can find more about an Indian diet and a list of the carbohydrate content of common Indian foods on page 29.

Western Diet: Many foods in Western countries carry nutritional labels listing their carbohydrate and calorie counts. For fresh produce, meats and a complete list of the carbohydrate content of Western foods and more, please visit www.calorieking.com It is also sold as a paperback book in many countries.

Can children with diabetes eat sweets?

Children with diabetes are allowed sugar-free ice cream, sugar-free soft drinks and sweets made with sugar substitutes. Parents may use sugar substitutes for children in moderation.



Children may eat 15-30 grams of regular sweets and cover the sweets with extra insulin on special occasions such

as birthdays and festivals.

Balanced Indian Vegetarian Diet

It is important that you eat three balanced meals a day. This is a picture of the different components of a balanced vegetarian meal. It shows vegetables filling half of the plate, carbohydrate one fourth and the last quarter taken by dairy and a fruit. Carbohydrate provides nearly half of the daily calories in an Indian vegetarian diet. If you cannot afford protein and carbohydrate is



your sole source of calories, then there are no restrictions on your carbohydrate intake. Milk, yogurt and homemade paneer are good sources of protein for a vegetarian diet. Lentils are an important part of a vegetarian diet. They

are 60% carbohydrate, 10% fiber and 20% protein when eaten with skin. For a non-vegetarian chicken is a better source of protein than red meat.

Carbohydrates

You may choose different foods in each category from the list below to give yourself variety and flexibility



1 chapati 30 grams

30 grams
1 bowl daal



Carbohydrate

as long as you do not exceed your total carbohydrate count per meal. The common carbohydrates present in an Indian diet are shown in these pictures.

All grains, lentils, rice, channa and products made out of Maida or besan are carbohydrates.

Lesser amounts of carbohydrates are also found in fruits, vegetables and milk. These foods are important for the calories they provide as well as micronutrients essential for growth.



Although carbohydrates raise blood glucose that does not mean that as a diabetic you should avoid them completely. Be aware however that some carbohydrates raise blood sugar faster than others. Both polished white rice and white flour raise blood sugar more rapidly than whole wheat flour and brown rice.

Diabetics are encouraged to eat some fruit daily. However, fruit juices raise blood sugar faster than whole fruit.

Children are also allowed three snacks per day'. For an 11:00 a.m. snack at school and a 5:00 p.m. tea time snack, the choices can be:

- One fruit

- Curd (yogurt) 1C
 - Lassi (buttermilk) 200ml
 - Vegetable soup 200ml
 - Plain popcorn 1C
 - Nimbu Pani (homemade lemonade with sweetener) 200 ml, is a good snack for children when they feel hungry in between meals. This has no calories. It helps to fill the stomach without adding calories or sugar. But if they are exercising, it is not good because it has no calories, and they need carbohydrates
 - 2 Tablespoons of almonds, peanuts or other nuts
 - 2 Tablespoonful of namkeen with no added sugar
- can also be eaten for snack
- **Bed time snack:** A glass of milk at night will protect against a night time low blood sugar reaction

Free Foods: You may eat these any time and in any amount.

- Carrots
- Cucumbers
- Radishes
- Tomatoes
- Pickles (**not** sweet)

What do I need to get started with Carbohydrate counting of my diet ?

All you need is a weighing scale and a measuring cup. It is best to weigh and measure everything initially until you develop a visual impression of the quantity.

Carbohydrate value of common Indian foods

* Carb Counting Food List (One cup (C) = 8 ounce)

* Any food containing 15 gms. of carbohydrate is called 1carb, 30 gms. will be 2 carb and 45 gms. will be 3 carb and so on.

* All the measurements are for cooked food unless specified otherwise.

Breads: 15 g Carb (1 carb)

1 slice bread, white or wheat

1 small pau/dinner roll

½ roti (bajra, makai, jowar) 6" diameter

1 chapatti, 6" diameter

¾ paratha or thepla, 6"

¾ potato paratha, 6"

1/4th of 8"x 2" naan

2 puris 5"

1 dosa approx 10" diameter

1 small idli

Starchy Vegetables: 15 g Carb (1 carb)

½ C potato sabji

½ C peas

½ C corn

½ C yam

Pulses/dals/beans: 15 g Carb (1 carb)

½ C lentils cooked

½ C toor dal cooked

½ C mung dal cooked

1 C thin mixed dal cooked

- ½ C kidney beans cooked
- ½ C chickpeas cooked
- ½ C lobia (black-eyed peas) cooked
- 1/3 C besan
- 1 C rasam
- ½ C sambar
- ½ C dhansak

Cereals/grains: 15g Carb (1 carb)

- ½ C poha
- ½ C Dalia (cooked)
- ½ C upma (cooked)
- ½ uttapam vegetable (small)
- ½ C cooked hot cereal
- 1/3 C white rice cooked
- ½ C khichri cooked
- 1 square dhokla
- 2 tbsp tapioca uncooked
- ½ C wheat sprouted

Milk/yogurt: 15 g Carb (1 carb)

- 1 C milk
- 1C buttermilk
- ½ C evaporated skim milk
- 1/3 C nonfat dry milk powder
- 1 C yogurt

Snack foods: 15g carb

- 1oz. bhelpuri
- 1oz chevda
- ½ C namkeen
- 6 pani puri
- 2 papad

$\frac{3}{4}$ veg samosa (1 samosa=21g Carbohydrate)

1 med vegetable cutlet

3 pieces pakoda spinach

1 kachori

2 pieces cauliflower bhajia

2 pieces dahi vada

1 $\frac{1}{2}$ C murmura (puffed rice)

Fruits: 15 g Carb (1 carb)

1 small apple

4 whole apricots

1 small banana (4oz) or $\frac{1}{2}$ medium

1 C cantaloupe/honeydew melon cubes

1 med. Chiku (sapota)

3 dates

2 med figs fresh

1 $\frac{1}{2}$ dried figs

$\frac{1}{2}$ C mixed fruit

17 grapes

4 loquats

1 kiwi

$\frac{1}{2}$ small mango ($\frac{1}{2}$ C)

1 small orange

1 C papaya cubes

$\frac{1}{2}$ med passion fruit

$\frac{1}{2}$ large pear or 1 small

$\frac{3}{4}$ C fresh pineapple

2 small plums

3 dried plums (prunes)

2 tbsp raisins

1 $\frac{1}{4}$ C strawberries

- 1 med seetaphal
- 2 small tangerines
- 1 ¼ C watermelon cubes

Juices: 15 g Carb (1 carb)

- ½ C apple juice
- 1/3 C grape juice
- 1/3 C mango juice
- ½ C guava juice
- ½ C orange juice
- ½ C pineapple juice
- 1/3 C prune juice

Sweets: 15 g Carb (1 carb) [limit to 10% of diet]

- 5 vanilla wafers
- 1 small ghulab jaman
- 1/3 C carrot halwa
- ¼ C sooji halwa
- ½ C kulfi
- ½ small laddoo
- 1 med rasgollah
- 1 small rasmalai
- ¼ C shrikand
- ½ C ice cream
- 1 tbsp honey
- 1 tbsp sugar

Vegetables: 5 g Carb/ 100 gms of cooked vegetables
(Count if serving size is more than 100 gms)

- ½ C cooked vegetables (green beans, bean sprouts, beets, broccoli, cabbage, carrots, cauliflower, eggplant, okra, onions, spinach, tomato, turnips, and squash etc.)
- 1 C raw vegetable

½ C tomato or vegetable juice

¼ C tomato puree

Free Foods: < 5g Carb and 20 calories

Foods like sugar free sodas and beverages, artificial sweeteners, spices and seasonings fall into this category.

For a more complete list of carbohydrates and the calorie count of foods, please visit:

www.calorieking.com

Additional Resources for nutrition

References 6-8, page 55

Monitoring of blood sugar

Why should children with diabetes check their blood sugar?



High blood sugar is harmful for all diabetics.

High blood sugar can damage eyes, kidneys and many other organs in the body and can lead to coma.

High blood sugar can interfere with children's growth.

Low blood sugar is also harmful and can make you feel so weak and tired that you cannot function. It can lead to coma rapidly

By checking your blood sugar frequently, you can avoid both high and low blood sugar.

How often do diabetics must check their blood sugar?

Children with diabetes need to check their blood sugar a minimum of four times a day, once before each meal and at bed-time. You should do an additional blood sugar test when you feel low.

What is a good level of sugar for a child with diabetes?

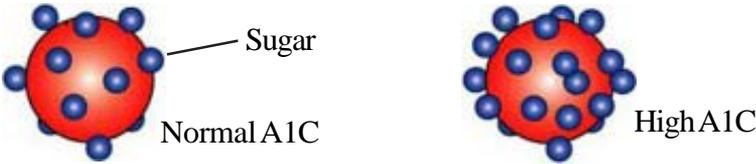
Pre-meal sugar 100-120

Post-meal sugar 150-180

Diabetes Control

How do I know that my diabetes is in good control?

An HbA1c test indicates an average level of blood sugar in your blood over the past 3-4 months. In the figure below the red blood cell on the left is carrying a normal level of sugar and on the right, is carrying a very high level of blood sugar in a patient with uncontrolled diabetes. This extra sugar causes complications of diabetes like, blindness, kidney failure, stroke and heart attack. So, it is important to know your A1C count and if it is high to talk to your doctor and find out ways to lower this count.



A1C

5.7% or below	Normal
5.8- 6.4%	Pre-diabetes
6.5 and above	Diabetes
Less than 7.5 %	Good control for children
Less than 7%	Good control for adults.

All children with diabetes should maintain A1C of less than 7.5% without hypoglycemia. By doing so they can avoid complications of diabetes and enjoy a normal life.

Where can I get A1C done?

It should be done in an approved laboratory. If your A1C is high, you need to discuss with your doctor as to how this level can be brought down.

Hypoglycemia

What is a low blood sugar reaction?

When there is too much insulin and not enough food, your blood sugar can drop to less than 80 mg. Then you feel:

- Weak
- Hungry
- Tired
- Sweaty
- A rapid heartbeat
- Drowsy
- Seizures
- Coma



If you FAIL to pay attention to low blood sugar symptoms, you could lose control and have a seizure or even lapse into a coma which is a life-threatening condition.

How do you treat a low blood sugar reaction?

You must eat a fast-acting food to raise your blood sugar immediately but also eat a food that will keep your blood sugar normal for a sustained period of time.

Immediately eat or drink 15 grams of carbohydrate, half fast-acting, half slow-acting. It is best to carry a mixture of 7.5 gms of dried fruit and 7.5 gms of nuts with you at all times, as this combination contains both a fast-acting and sustained-acting food. If you do not feel better in 15 minutes, check your blood sugar again. If it is still 80 mg or less, then eat another 15 grams of carbohydrate.

If your hypoglycemic reaction occurs just before meal time, eat your meal at once, and take the meal dose of insulin immediately after finishing your meal.

Here are some examples of 15 gm of fast acting and sustained acting foods.

Fast-acting

2-3 teaspoonful of sugar
Two toffees
Two biscuits
½ glass of orange juice
½ glass of regular coke
One apple

Sustained-acting

½ glass of milk
½ cup yogurt
one slice of bread
one small roti

What are the circumstances when you might get a low blood sugar reaction?

- You took a regular dose of meal time insulin but did not eat all of your meal or you vomited the entire meal.



- You did an extra amount of unplanned exercise such as a bike ride or a hard game of basketball, or running.

Exercise Guidelines

What are the guidelines for exercise for children with diabetes?

- It is recommended that all children do one hour of exercise daily.
- When at school it should be planned after lunch if possible.
- Always take your blood sugar meter with you and check your blood sugar before, during and after exercise.
- A starting blood sugar of 110-180 is good.
- If your blood sugar is 300 mg must check urine for ketones and if positive DO NOT exercise. It may result in diabetes ketoacidosis and coma.
- Dehydration is common so for a mild exercise like walking for 45 minutes drinking water is fine.
- For high intensity exercise like running, biking, cricket, basketball, etc. drinking Gatorade or other liquids which have carbohydrates and electrolytes are good.
- Always take 15 gms of carbohydrates before starting exercise for a blood sugar of 90-125. For further instructions for a specific exercise please discuss with your doctor or diabetes educator.
- Always remember **some** people can get delayed hypoglycemia anytime during the 24 hrs. **after** the exercise.

Management of diabetes during illness

What should a person with diabetes do during an illness such as a cold or fever?

Even though you may not be eating during an illness such as a cold, fever, diarrhea or vomiting, there is plenty of sugar entering your blood from the stores inside your body. Surpris-



ingly, a diabetic may need even more insulin during illness. You must check your blood sugar more frequently and contact your doctor who may advise an extra dose of insulin. When ill, diabetics should drink plenty of non-surgery fluids and check their tempera-

ture. Vomiting can quickly result in dehydration, and you may need to go to the hospital for intravenous fluids.

Diabetes Care is a team work

The key to successful diabetes treatment is when a child, his or her family and a doctor and a diabetes educator work as a team.



Everyone has responsibilities.

The child's responsibilities:

After the age of seven, children are expected to prick their finger for their own blood test and give their own injections. Almost all children tell us that it hurts less when they do these tasks themselves.



Children should be involved in choosing their foods. Children do better when they are given choices and not orders. This way when they grow up, they will be independent and able to make good choices for themselves. Children should also write down their blood test results in a book, so that they can learn the pattern of their blood sugars.



Parent's responsibilities:

Be consistent with meal times. If a child has taken his or her insulin, food should be available to eat within 15-30 minutes depending on the type of meal type insulin.

- Keep a supply of insulin and test strips.
- Check your child's meter to verify that she or he is recording results accurately. Keep track of insulin to make sure that your child is not forgetting injections.



- Provide necessary information about your child's diabetes to the school. Make sure that your child is not discriminated against.
- Encourage your child to participate in all activities including sports.
- Inform the school about the symptoms of low blood sugar and its treatment. Provide snack food for your child to take along for when she or he feels a low blood sugar reaction coming on during school.

Your medical team's responsibilities:

Your doctor is in charge of all medical aspects of your diabetes. This includes:

- Educating you and your family about diabetes, insulin and diet.

- Adjusting your insulin dose based on your blood sugar tests.
- Monitoring your growth and development.
- Watching for complications of diabetes.
- Being available by phone for emergencies and advice on your insulin dose and blood sugar levels.

A nurse and a diabetes educator will teach you how to administer your insulin injections, take your blood tests and how to keep good records of your blood sugar levels and when to call the doctor.



A certified diabetes nurse educator will go over all the chapters listed in this book one by one until you are comfortable in taking care of your diabetes.

Traveling with Diabetes

How should you and your family prepare for travel?

Always plan ahead.

Bring plenty of insulin, blood test strips and your meter.

Be aware that lack of normal activity while sitting in a car or train may raise your blood sugar, and you may need more insulin.

Bring food with you.

Keep your schedule of meals and insulin consistent.

Most children get in trouble with their diabetes when they are out of town and they and their parents have not thought of everything ahead of time. You should wear an ID bracelet or



necklace saying you have type one diabetes and are on insulin. In case of an accident, an ID bracelet or necklace can give doctors information to help you in case family members are not there. When trips are planned well, the whole family will have an enjoyable time.

Carry a sturdy box with diabetes supplies including the following items:

1. Adequate supply of insulin
2. Extra vials and cartridges in case one should break
3. Syringes and pen needles
4. Meter and test strips
5. Record book
6. Telephone number of your doctor



7. Telephone number of a nearby hospital that can care for a child with diabetes.
8. Snacks
9. Thermometer
10. Medications for fever
11. Alcohol to clean cuts and wounds
12. Band-aids to cover cuts
13. Antibiotic cream for cuts

Note: If flying, do not check-in your insulin box. Keep it with you in your carry-on luggage.

Psychological Issues of Children with Diabetes

How might diabetes affect a child psychologically?

Children always trust their parents. If parents tell their child that they are going to be fine, the child truly believes that he or she will be fine.

Always treat your child as normal. Allow your child to do everything other children do. Be truthful to your child and give her or him hope, but do not make false promises. Never think that your child is defective in any way. Never let your child feel that he or she is good only if his or her blood

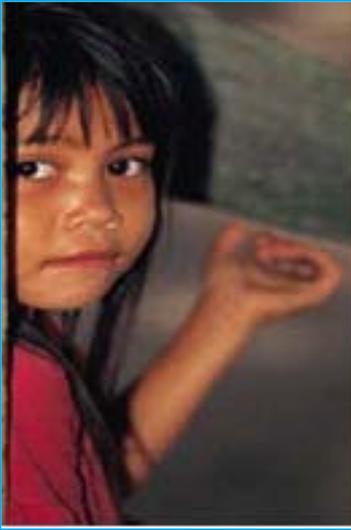


sugar is good. Make your child feel that regardless of his or her blood sugar, you will always love her or him unconditionally.

Respect your child's privacy:

Never introduce your child to strangers as a diabetic first and your child second. Your child's diabetes should not be the talk of the town. Only your child's school, family members and close friends who are supportive of you should know that your child has diabetes. Do not allow people to feel sorry for you or for your child. Let your child know you are proud of her or him.

What are the most common problems parents should be aware of?



Children want to please their parents. A child learns very quickly that parents are happy when his or her blood sugar is good, so sometimes a child may falsify blood sugar levels. As children become more independent, they sometimes cheat on food at school or when out with friends. Also, your child may sometimes fake a low blood sugar reaction in order to have more food.

It is normal for a child to say that she or he does not like being diabetic. A child may get depressed and feel sad. Parents should be on the lookout for these periods of sadness and reassure their child.

If you find your child cheating on food or falsifying blood sugar tests, it is better to talk to your child and make him or her understand rather than punishing your child.



A diabetic diet is a healthy diet and the whole family would do well to eat the same diet. That way your child will not feel different from the rest of

the family, and the family will not have to prepare two different meals.

Screening for Complications and associated conditions in type one diabetes

Are children with diabetes prone to other diseases?

The process that destroys your pancreas can also destroy your thyroid gland. Therefore, children with diabetes should be screened for an underactive thyroid (hypothyroidism). Hypothyroidism can interfere with a young child's growth, but it can be easily treated with tablets.

Children with diabetes are also prone to a condition called celiac disease. In this condition children have intolerance to foods containing gluten. If a child is not growing well and has bouts of diarrhea, parents should talk to their child's doctor.

What do you mean when you say that high blood sugar can cause complications?

High blood sugar in uncontrolled diabetes over a long period of time builds up in eyes, kidneys and blood vessels of the heart and nervous system. If not treated properly, in time high blood sugar can cause blindness, kidney failure, heart attack and neurologic damage.

Therefore, children who have had diabetes for five years and are over the age of ten should:

- Have their eyes checked for diabetes-related complications by an ophthalmologist after dilating their eyes with drops.
- Have their urine checked for Microalbuminuria to

detect early kidney damage

- Have a fasting lipid profile especially if there is a family history of heart disease

- Frequency of subsequent testing for complications will depend upon the results of the initial testing and your diabetes control. Please ask your doctor for further advice.

It is important to remember, many of the complications of diabetes in initial stages are reversible with improved diabetes control.

Is there a cure for diabetes?

There is no cure for diabetes today. But the treatments have advanced so much that children can lead a very normal and productive life. There is a lot of diabetes research going on in the world, and soon there will be a cure. Until then, learn to balance insulin, food and exercise to keep blood sugar near normal and A1c close to 7%. This approach will help prevent the complications of diabetes. Remember, children with diabetes are normal and you can do and become anything you want.

Diabetes Care Team

A diabetes team consists of a physician trained in care of children with diabetes, a diabetes educator and a social worker.

A physician teaching insulin Injection to child



Diabetes Educator teaching children about diabetes

A social worker helping a mother and a child with blood sugar charting



Role of a Support group

What can be done so that children with diabetes and their families do not feel alone?



Diabetes support groups are a great place for children to vent their feelings about being diabetic and for families to support each other. Support groups are also a platform to advance the child's and their family's education about diabetes, to share recipes for healthy cooking and to plan fun activities for children

An internet-based support group meeting connecting diabetic children in India and the USA.



Foot Care for People with Diabetes

People with diabetes have to take special care of their feet. Diabetes leads to decreased circulation of blood in the feet and high blood sugar impedes wound-healing in the feet. Nerves of the feet are also adversely affected and detection of any foot-wound may get delayed.



Wash feet daily with lukewarm water and soap



Dry feet well, especially between the toes



Keep the skin soft with a moisturizing lotion, but do not apply it between the toes



Check feet for blisters, cuts or sores, redness or swelling. Tell your doctor right away if you find something wrong



Cut your nails carefully; do not use scissors



Wear clean, soft socks. Keep feet warm and dry



Wear shoes made
for diabetics



Never walk
barefoot indoors
or outdoors



Examine your shoes
every day for
cracks, pebbles,
nails or anything that
could hurt your feet

Children with diabetes on the path to normal living

We have made considerable progress. Now we have 120 children who are using 4 injections of insulin, with SMBG and carbohydrate counting on a daily basis. For the first time they are beginning to feel that they may be able to realize their dream of normal living. For instance, several of these children won first, second and third



positions in an International Essay Competition (*Life For a Child* program of International Diabetes Federation), and four children secured certificates of excellence. This book has been written by inspiration of such children. We have published our results and our program in detail in *Journal of Diabetes*, February 2016, as listed in the references.

Famous People with diabetes

You are not alone

If you have been diagnosed with diabetes, don't lose heart. Take a look at some famous diabetics who went on to influence the world in their chosen fields.

Indians

- Swami Vivekananda.

Sports Personalities

- Wassim Akbar – Cricketer
- Arthur Ashe – Tennis star
- “Smokin Joe” Frasier – Boxer

Scientists

- Thomas Alva Edison – Scientist
- Lois Jovanovich–Peterson – Endocrinologist

Musicians

- Tony Bennett – Singer
- Elvis Presley – Singer/Actor

Movie Stars

- Halle Barry – Actress
- Elizabeth Taylor – Actress
- Spencer Tracy – Actor
- Jerry Lewis – Actor/Comedian

Other Famous Personalities

- Ernest Hemingway – Author
- George Lucas – Director/Producer (Star Wars)

Acknowledgments

I would first like to thank my husband, Dr. Jitendra Kumar Gupta, for being my steadfast partner in this journey of diabetes care in India. We took up this challenge together, and he has always been by my side with his advice and support. We are co-founder of Manav Seva Foundation, a non-profit organization, registered in USA, and dedicated to providing diabetes care to marginalized population in Northern India.

Our daughter, Sandhya Gupta Kaul, a non-profit professional, is key to our taking up the work in India. She regularly has encouraged and helped us.

This program would not have been possible without the help of Dr. Graham Ogle, General Manager, International Diabetes Federation, Life for a Child Program, and Insulin for Life - USA. They provided grant, insulin and diabetes monitoring supplies.

I am grateful to Rama Krishna Mission Sevashram, Haridwar, and Vrindaban for providing facility and staff members for us to work with.

Finally, I would like to thank Washington University in Saint Louis, USA for their support by sending residents to work with us at RKM Haridwar.

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Readers' Comments

“This book is a comprehensive and thoughtful approach to managing diabetic kids in India and other countries. It is a wonderful resource for practitioners and families.”

– Dr. Wendy Hulsing (Pediatrician)

“I enjoyed your manuscript and there was a lot of information.”

– Dr. Deborah V Edidin

“What a lot of work and love you have put into this book. The content is straight forward, clear and readable.”

– Suzy (School Teacher)

“This book must be a savior for diabetic kids in India.”

– John (type one diabetic)



C.D.E.I Team workers from Haridwar & Vrindavan



Trainees of Certified Diabetes Educator India (CDEI), Vrindavan

Dr. Santosh Gupta was born and raised in India. After receiving her medical degree from the University of Lucknow, she went to England for further training in Pediatrics. She received a Diploma in Child Health from the University of London, and subsequently became a Member of the Royal College of Physicians (MRCP), UK. In 1970, she joined Washington University School of Medicine in Saint Louis, USA, for a fellowship in Pediatric Endocrinology. She is a Diplomat of American Board of



Pediatric Endocrinology. She joined the Faculty of Washington University School of Medicine and was later promoted to Associate Professor. She is also a Certified Diabetes Educator (USA).

For approximately ten years, starting 2006, Dr. Gupta spent several months of each year developing and running a comprehensive diabetes program to treat marginalized populations with Type 1 Diabetes at Rama Krishna Mission Hospital in Haridwar and Vrindaban in Northern India. The program was supported by Manav Seva Foundation USA which she also co-founded with her

husband, Dr. Jitendra Gupta. Support also came from International Diabetes Federation (IDF-LFAC) and Insulin for Life, USA. She established the Certified Diabetes Educator, India (CDEI), program which received recognition from the International Diabetes Federation.

Dr. Gupta has a loving and supportive family that consists of a son, a daughter, and three grandchildren. She now lives in Florida with her husband.

Bar code, etc.