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Type 1 DM- Mellitus
Together we win



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Type 1 Diabetes Mellitus From problem to solution

To all the brave children with diabetes
who fought the battle and won

Contributor
Dr Anurag Bajpai



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Growth & Obesity Workforce

Type 1 DM- From problem to solution

Childhood diabetes is a common disorder with a prevalence of 1 in 500 children. Unfortunately the diagnosis is missed in many with disastrous consequences. Diagnosis of diabetes in a child comes as a shock to the family. This coupled with the need for life long daily injections is enough to create panic. Parents often seek alternate remedies to stop insulin with life threatening consequences. While managing a child with diabetes is a challenge; the challenge can be successfully overcome. Given the advances in medicine, a child with diabetes can lead a healthy and fruitful life. Empowerment of the child and family is essential to achieve this goal.

Type 1 DM- From problem to solution is an effort in empowering families with diabetes to wage this battle against diabetes. The book focuses on practical issues faced by these children and provides simplistic solutions to the same. The book is aimed to be a tool to assist diabetic educators and nutritionists impart knowledge to families with diabetes. Complimentary resources in the form of educational videos, home posters and detailed discussions on individual issues are available online. We hope that this small effort of ours would help children with diabetes win their battle.

Dr Anurag Bajpai,
General Secretary,



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Growth & Obesity Workforce



Physician Awareness



30 workshops, 3 courses

Teacher Sensitization



Growth monitoring in 20 schools

Patient Support



Four patient support groups

Public Awareness



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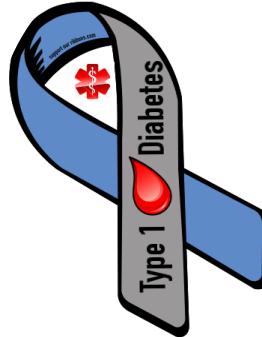


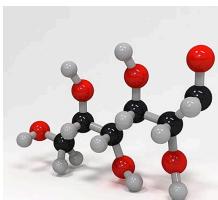
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What is Diabetes?

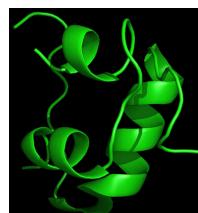
What is glucose?

Glucose is the ready source of energy that helps our body do all the activity. Low and high glucose are harmful



What controls blood glucose?

Insulin is the main controller of blood glucose. It is produced by beta cells of pancreas in the stomach.



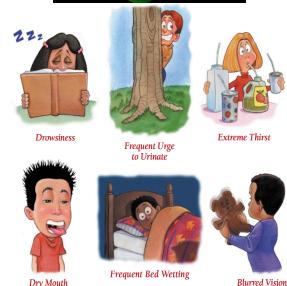
When to think of diabetes?

Weight loss

Increased urination

Recurrent infections

Immediate blood and urine sugar

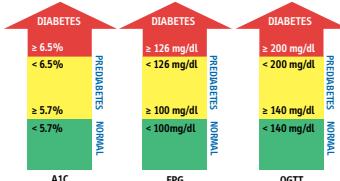


When is it diabetes?

Fasting sugar more than 126 mg/dL

Random blood sugar > 200 mg/dL

HbA1c > 6.5%



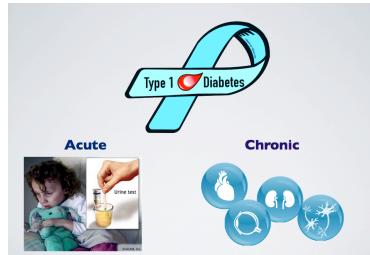
Why worry about diabetes?

Diabetes causes many problems

Immediate- Ketoacidosis

Long term- Effects all parts of body

Need for good glucose control

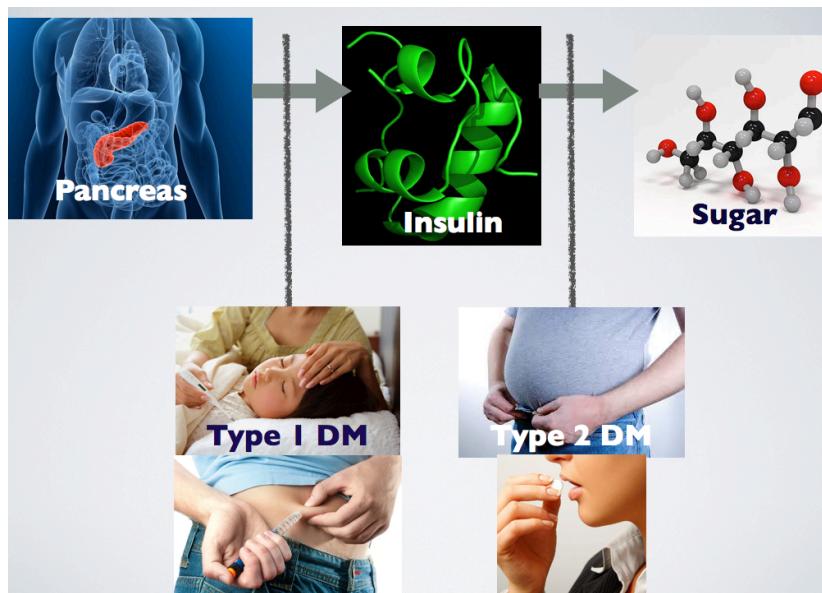


Is it type 1 or type 2 diabetes?

Causes of diabetes

Reduced insulin production (type 1) or action (type 2)

Feature	Type 1 DM	Type 2 DM
Cause	Reduced insulin production	Reduced insulin action
Course	Rapid	Slow
Age	In any age group	Usually after 12 years of age
Obesity	Less common	Common
Treatment	Insulin	Oral medicines



Fact

Type 1 DM is common and is seen in 1 in 500 children

What causes type 1 diabetes?

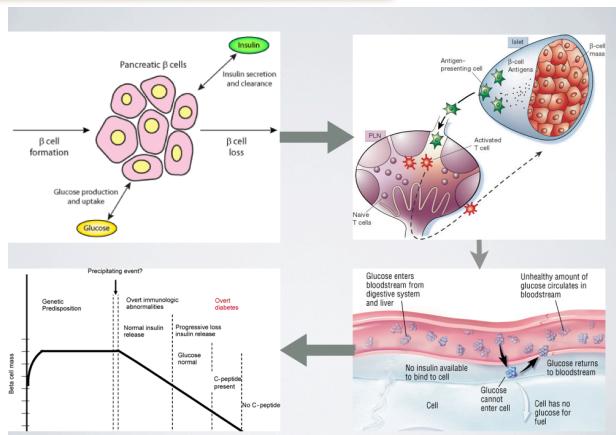
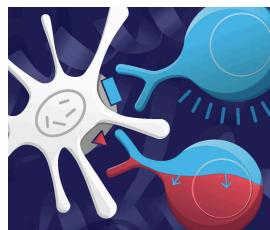
Immunity- Our defense force

Immune system helps to fight infections. Rarely it may damage beta cells in friendly fire and cause T1DM.



What triggers autoimmunity?

The exact cause is unknown but is a mixture of genetics and environment. Importantly this cannot be changed.



Why us?

T1DM is not due to life style problem or mistake of the family

Fact

It takes few years of damage to beta cells to cause diabetes; but once it has happened over 95% cells have been destroyed

Is it the end of the road?

Type 1 DM a shock?

While diagnosis of diabetes comes as a big shock; things improve quickly.

The bad part

Need for life long injections, regular glucose monitoring and nutritional control.

The glass is half full

Numerous scientists, movie stars and sports players have fought type 1 DM and won.

The good part

Many children die even before diabetes is diagnosed. Timely diagnosis is therefore great.



Hope for the future

A century ago type 1 DM was a death sentence. Things are improving rapidly and would continue to do so. **Cure for Type 1 DM is not far.**

How is type 1 DM treated?

Multidisciplinary approach

Type 1 DM management requires a multidisciplinary approach.

Team members

- Pediatrician/endocrinologist
- Pediatric nutritionist/educator
- Social worker

Components

- Insulin therapy
- Life style measures
- Monitoring

Nutrition, sick day

Awareness

Empowerment

Insulin

Dose, regimen

Monitoring

Glucose, HbA1c

Principles

- Involvement of child
- Empowerment of family
- Understanding of disease
- Social support when needed



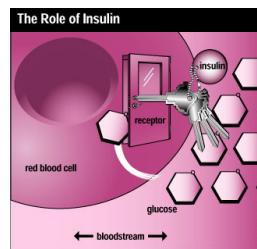
Fact

Comprehensive diabetic management is the key to success.

Insulin the wonder drug

Insulin- The ray of hope

Insulin is the only treatment for T1DM. It acts as the key for glucose gates of the body that allows their use.

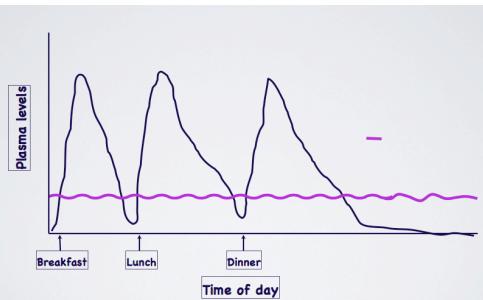


No pain, no gain

Insulin is destroyed by the stomach and thus cannot be given as tablet.
It has to be given as an injection.



Insulin secretion



Body secretes insulin continuously with spikes during meals.

Insulin is directly secreted in its site action, liver.

Fact

There is no role of alternative medicines in type 1 DM.
All children with T1DM used to die before insulin was discovered.

Insulin- What, why and how?

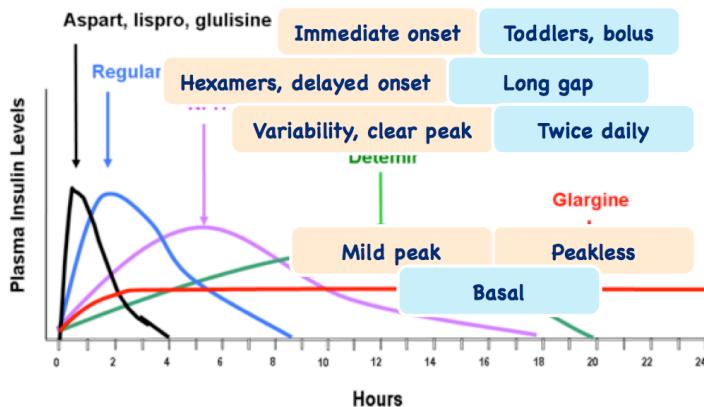
How is insulin made?

Earlier insulin was obtained from animals. Now it is produced in the laboratory using DNA technology.

Are all insulin same?

No. Different types of insulins have been designed to change their time course of action.

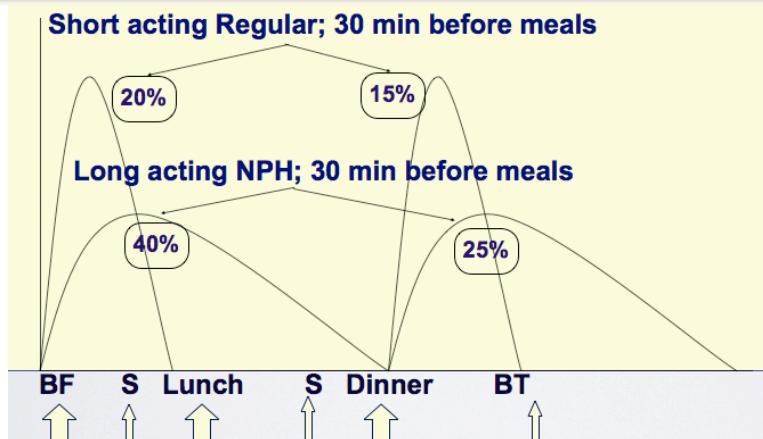
Types of insulin



Type	Onset	Peak	Duration
Rapid			
Lispro Aspart Gulisia	5-15 min 10-20 mun 10 min	45-90 min 1-3 hr 40-130 min	3-4 hr 3-5 hr 6 hr
Short			
Regular	30 min	2-5 hr	5-8 hr
Intermediate			
NPH	1-3 hr	6-12 hr	16-24 hr
Long acting			
Glargine Detemir	2-4 hr 3-8 hr	24 hr 24 hr	20-24 hr 6-24 hr

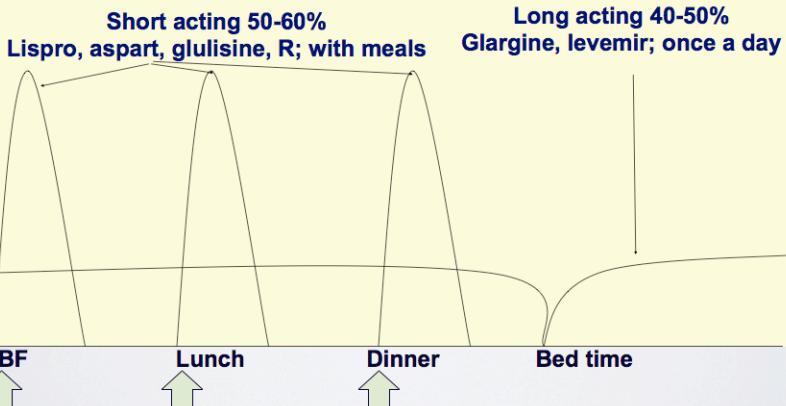
Insulin regimens

Mixed split regimen- Two injections



More fluctuations, rigid, need to follow insulin

Basal bolus- Four injections



Less fluctuations, hypoglycemia, flexibility

Insulin doses and adjustment

Insulin dose and distribution

Age	Dose unit/kg/day
< 10 years	0.6-0.8 unit/kg/day
10-14 years	1.2-1.5 unit/kg/day
> 14 years	1.0-1.2 unit/kg/day

Regimen	Long acting	Short acting
Basal bolus	40-50%	50-60%
Split mix	65%	35%

Insulin adjustment as per blood sugar timing

Basal bolus

Time	Dose to adjust
Before breakfast	Long acting
Before lunch	Breakfast short acting
After lunch	Lunch short acting
Before dinner	Long acting
After dinner	Dinner short acting

Mixed split

Time	Dose to adjust
Before breakfast	Night NPH
Before lunch	Morning regular
Before dinner	Morning NPH
After dinner	Night regular

Insulin practical issues

Where to store?

Refrigerator at 2-8 degree Celsius.
Can also keep in dark and cool place.



Where to keep opened insulin?

Keep in fridge
Take out 15 minutes before injection
Inject at room temperature



What to avoid?

Freezing
Exposure to sun light.
Leaving in hot car under sun light.



How long to use?

One month after opening of vial.
If unopened till date of expiry



Fact

Insulin is unstable and should be kept in correct environment.

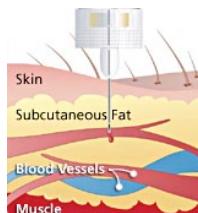
Where to give insulin?

Where to inject?

Fat pad below the skin

Avoid muscle (pain, rapid absorption)

Avoid skin (pain, less absorption)

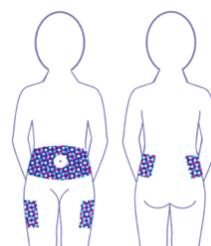


Which sites to give?

Best sites are abdomen and thigh.

Buttocks can be used in toddlers.

Don't give in arms as less fat present.

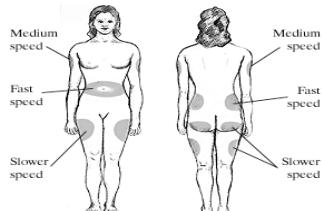


Are all sites same?

Rate of absorption depends on site.

Abdomen > arms > thigh).

Stick to same site for the time of day.



Why rotate sites?

Giving injection at the same point causes lumps which reduces insulin absorption. This is avoided by rotating the injection site.



Fact

Insulin absorption is higher in hot weather and exercise.

Use of buttocks in this situation would be helpful.

Injection devices

Device	Mechanism
Needle and syringe	Insulin is injected underneath the skin with needle and syringe
Insulin pens	Turn a dial to select desired dose of insulin and press plunger
Insulin jet injectors	High pressure air system sends a fine spray of insulin through the skin without needle
Insulin pump	A tube that ends with small needle is inserted under the skin. The tube attaches to pump that releases insulin throughout the day.

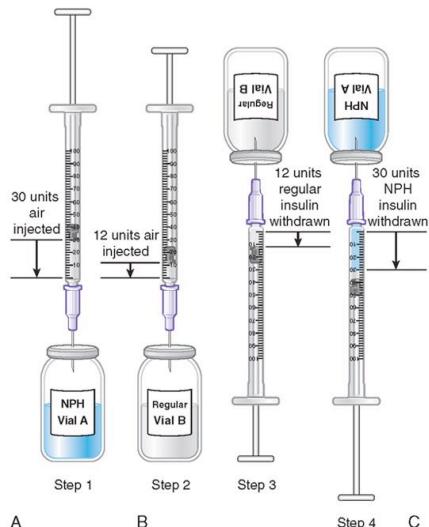
Injection with syringe

Which syringe to chose?

As per insulin concentration U40 for 40 unit/ml, U100 for 100 U/ml

Steps in insulin injection

1. Shake the vial
2. Withdraw the insulin in syringe
3. Pinch the skin to raise skin fold
4. Inject at 45-90 degrees
5. Wait for 5-10 seconds
6. Withdraw syringe slowly
7. Stretch the skin



Precautions

1. Do not recap or bend the needle
2. Change syringe if causing pain
3. Put disposable in sharp container
4. Dispose sharp container safely

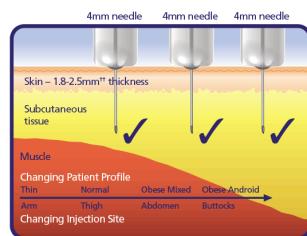
Pain in injection

- Intramuscular injection
- Cold insulin
- Burning with glargine
- Old needle

Injection with pen

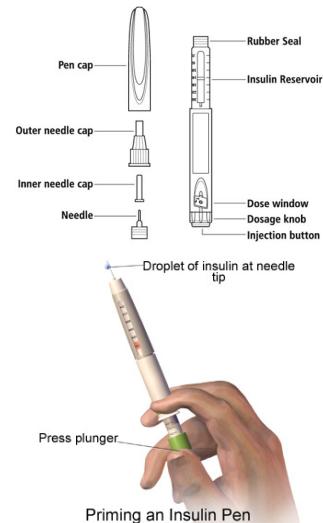
Which needle to chose?

Choose according to weight. Longer needles for obese children and shorter for lean children



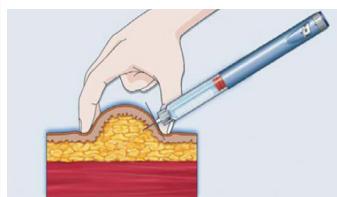
Steps in insulin injection

1. Give 15 min from taking from fridge
2. Shake the pen slowly
3. Inject out 1-2 units as priming
4. Pinch the skin to raise skin fold
5. Inject at an angle of 45-90 degrees
6. Wait for 5-10 seconds
7. Withdraw pen slowly
8. Stretch the skin



Precautions

1. Change needles frequently
2. Do not shake the pen rigorously
3. Priming before injection.
4. Remove needle before storing.



Fact

Mild bruises and bleeding are common with insulin injection and not a cause of worry.

Insulin pump

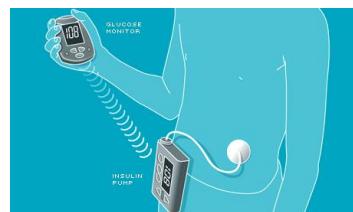
What is insulin pump?

Insulin pump is a mobile like device that injects insulin in a continuous manner. Extra insulin can be injected during meal time to cover meals.



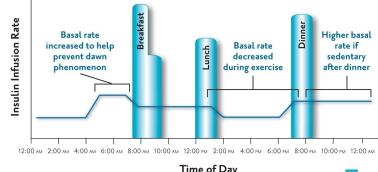
Is sugar check needed?

Regular sugar measurement is essential for a child on pump. Newer pumps allow link with CGMS.



How is insulin dose decided?

Based on existing blood sugar and amount of carbohydrate intake.



What age can pump be used?

Pump can be used from any age even in a child of 2 years of age.



Fact

Insulin pump is only another way of giving insulin. Regular monitoring and supervision is essential in these children.

Nutrition

General principles

No diabetic diet for children
Normal healthy diet recommended
Consistent meals

Energy requirement

Calorie intake should be as per requirement for age and weight.

What to take liberally?

Fibers
Fruits
Vegetables

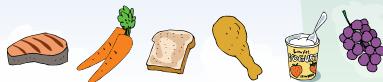
What to avoid?

Junk food
Cold drink
Oily stuff

Tips for Families

Eat Right

- 1 Make half your grains whole.** Choose whole-grain foods, such as whole-wheat bread, oatmeal, brown rice, and lowfat popcorn, more often.
- 2 Vary your veggies.** Go dark green and orange with your vegetables—eat spinach, broccoli, carrots, and sweet potatoes.
- 3 Focus on fruits.** Eat them at meals, and at snack time, too. Choose fresh, frozen, canned, or dried, and go easy on the fruit juice.
- 4 Get your calcium-rich foods.** To build strong bones, serve lowfat and fat-free milk and other milk products several times a day.
- 5 Go lean with protein.** Eat lean or lowfat meat, chicken, turkey, and fish. Also, change your tune with more dry beans and peas. Add chick peas, nuts, or seeds to a salad; pinto beans to a burrito; or kidney beans to soup.
- 6 Change your oil.** We all need oil. Get yours from fish, nuts, and liquid oils such as corn, soybean, canola, and olive oil.
- 7 Don't sugarcoat it.** Choose foods and beverages that do not have sugar and caloric sweeteners as one of the first ingredients. Added sugars contribute calories with few, if any, nutrients.



Exercise

- 1 Set a good example.** Be physically active and get your family to join you. Have fun together. Play with the kids or pets. Go for a walk, tumble in the leaves, or play catch.
- 2 Take the President's Challenge as a family.** Track your individual physical activities together and earn awards for active lifestyles at www.presidentschallenge.org.
- 3 Establish a routine.** Set aside time each day as activity time—walk, jog, skate, cycle, or swim. Adults need at least 30 minutes of physical activity most days of the week; children 60 minutes every day or most days.
- 4 Have an activity party.** Make the next birthday party centered on physical activity. Try backyard Olympics or relay races. Have a bowling or skating party.
- 5 Set up a home gym.** Use household items, such as canned foods, as weights. Stairs can substitute for stair machines.
- 6 Move it!** Instead of sitting through TV commercials, get up and move. When you talk on the phone, lift weights or walk around. Remember to limit TV watching and computer time.
- 7 Give activity gifts.** Give gifts that encourage physical activity—active games or sporting equipment.

HAVE FUN!



Type of foods

What are food pyramid and eat well plate?

Food pyramid and eat well plate indicate the frequency of intake of food groups.

How to use the Pyramid

The recommended number of servings for children (from 5 years of age^{*)}) and adults is highlighted beside each shelf. For example, to get at least a serving from the Fruit and Veg shelf you could have:

$\frac{1}{2}$ a glass of fruit juice = 1

3 dessertspoons of veg = 1

1 apple = 1

1 banana = 1

TOTAL = 4



DRINK WATER REGULARLY - AT LEAST 8 CUPS OF FLUID PER DAY

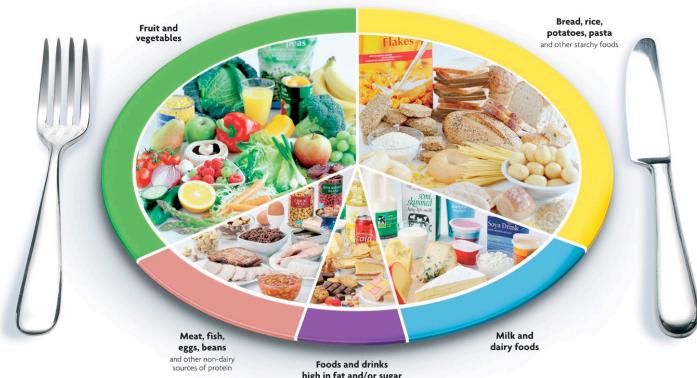
Folic Acid - An essential ingredient in making a baby. If there is any possibility that you could become pregnant, then you should be taking a folic acid tablet (400 micrograms a day)

* For younger children, start with smaller and fewer servings and increase up to the guidelines recommended, according to the child's own growth and appetite.

The eatwell plate



Use the eatwell plate to help you get the balance right. It shows how much of what you eat should come from each food group.



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Carbohydrate counting

Food components

What are food components?

Food consists of components that play important role in body. Major components include carbohydrate, protein and fat. Minor components include vitamins, minerals and iron.

	CARBS	PROTEIN	FAT
Why we need?	Main source of energy	Essential for growth, tissue repair, muscle	Nerve and tissue, hormone
How they are used?	Breakdown into glucose.	Alternate source of energy	Concentrated source of energy
Where to get from?	Bread, roti, fruits , vegetables, milk, sugar	Meat, poultry, egg, milk, cheese, nuts, beans	Butter, oil, nuts, mayonaise

Carbohydrate counting

Why is important to count carbohydrates?

Carbohydrates are the most important component of diet deciding blood glucose levels. Counting carbs helps in deciding insulin dose.

Age	Daily Carbohydrate Needs (grams)*	Per Meal (grams)	Per Snack (grams)
5-10	Male and Female 200-275	50-70	15-20
11-15	Males: 275-400 Females: 275-300	70-90	30-45
16-18	Males: 300-475 Females: 250-300	75-100	30-50

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Fruits and vegetable

Red <ul style="list-style-type: none">- Tomatoes- Red peppers- Watermelons	
Yellow & Orange <ul style="list-style-type: none">- Papayas- Carrots- Oranges- Rockmelons	
Green <ul style="list-style-type: none">- Green leafy vegetables- Honeydew melons- Kiwis- Broccoli	
White <ul style="list-style-type: none">- Cabbage- Cauliflowers- White turnips- Bananas	
Purple <ul style="list-style-type: none">- Plums- Purple grapes- Eggplants	

The good eating guide

What to do?

- Regular meals
- Drink lots of water
- Have family meals

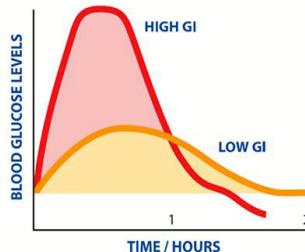
What not to do?

- Watching TV while eating
- Snacking
- Missing breakfast

Glycemic index

What is glycemic index?

Glycemic index informs about the rate of rise of blood glucose after intake of a substance compared to glucose.



What glycemic index means?

High GI suggest faster rise in blood glucose and risk of hyperglycemia for the substance.

Glycemic Index Chart



GLYCEMIC INDEX CHART								
Low Glycemic (55 or Below)				High Glycemic (70 or Higher)				
SNACKS	G.I.	STARCH	G.I.	VEGETABLES	G.I.	FRUITS	G.I.	DAIRY
Pizza	33	Bagel, Plain	33	Broccoli	10	Cherries	22	Yogurt, Plain
Chocolate Bar	49	White Rice	38	Pepper	10	Apple	38	Yogurt, Low Fat
Pound Cake	54	White Spaghetti	38	Lettuce	10	Orange	43	Whole Milk
Popcorn	55	Sweet Potato	44	Mushrooms	10	Grapes	46	Soy Milk
Energy Bar	58	White Bread	49	Onions	10	Kiwi	52	Skim Milk
Soda	72	Brown Rice	55	Green Peas	48	Banana	56	Chocolate Milk
Doughnut	76	Pancakes	67	Carrots	49	Pineapple	66	Yogurt, Fruit
Jelly Beans	80	Wheat Bread	80	Beets	64	Watermelon	72	Custard
Pretzels	83	Baked Potato	85	Onions	75	Dates	103	Ice Cream

Glycemic Index values obtained from www.lownglycemicdiet.com, www.nutritiondata.com and www.diabetesnet.com

Fact

Low GI food controls sugars. Have at least one with each meal.

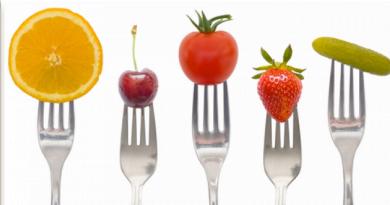
Sample meal plan

Meal	Exchange	0-3 yr	4-6 years	6-9 years	> 9 yr
Early morning	Toned milk Almonds	1/2 cup 5-6	1 cup 5-6	1 cup 5-6	1 cup 5-6
BF	Milk/curd	1/2 cup	1 cup	1 cup	1 cup
	Wheat Oat dalia	1/4 med bowl	1/2 med bowl	1 med bowl	1 med bowl
	Options Boiled egg Cornflakes Brown toast Veg roll	1 1/2 cup 1 slice 1 small	2 1 cup 1 slice 1 medium	2 1 cup 2 slices 2 medium	2 1 cup 2 slices 2 large
Mid morning	Options Buttermilk Sprouts Chana chaat	1/2 cup 1/2 sml bowl 1/2 sml bowl	1 cup 1 sml bowl 1 sml bowl	1 cup 1 sml bowl 1 sml bowl	1 cup 1 sml bowl 1 sml bowl
Lunch	Options Chapati/daal Missi roti Besan cheela Vegetable khicdi Rice	1 1 small 1 small 1 bowl sml 1/2 katori	2 2 small 2 small 1 med bowl 1 katori	2 2 small 2 small 1 med bowl 1 katori	2 2 small 2 small 1 med bowl 1 katori
Early evening	Milk	100 ml	150 ml	200 ml	250 ml
Late evening	Options Roasted chana Besan cheela Brown sandwich Poha	1 handful 1/2 1 1/2 cup	2 1-2 2 1 cup	2 1-2 2 1 cup	2 1-2 2 1 cup
Dinner	Options Chapati/daal Missi roti Besan cheela Vegetable khicdi Rice	1 1 small 1 small 1 bowl sml 1/2 katori	2 2 small 2 small 1 med bowl 1 katori	2 2 small 2 small 1 med bowl 1 katori	2 2 small 2 small 1 med bowl 1 katori
Bedtime	Milk	100 ml	150 ml	200 ml	200 ml

Party time and eat out

Party rules

- Frequent snacks and fruits
- Prefer salty stuff
- Timely insulin



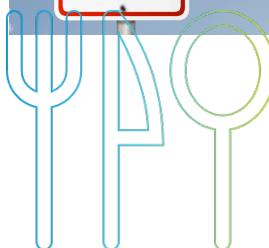
What to avoid?

- Carbonated drinks
- Excessive sweet dishes
- Not eating for a long time



Eating out

- Club with meals
- Extra dose of insulin
- More physical activity



Fasting

- Careful sugar monitoring
- Avoid short acting insulin
- Reduce long acting insulin



Fact

Children with diabetes can enjoy occasional parties and treat.

Physical activity

How much?

30-45 minutes daily

At least 5 days a week

Maximum gap 2 days

Get active your way ...

*build physical activity
into your daily life...*

at home

at school

at work

at play

on the way



.... that's active living !

What to do?

Playing

Running and cycling

Dancing and aerobics

What not to do?

Too rigorous exercise

Weight bearing exercise

Screen time more than 1 hour

CUT DOWN ON

- T.V. watching
- Video and computer games
- Sitting more than 30 minutes at a time

2-3 TIMES A WEEK



- Leisure & Playtime
- Swinging
- Canoeing
- Tumbling
- Miniature golf



- Strength & Flexibility
- Push-ups/pull-ups
- Martial arts
- Dancing
- Rope climbing

3-5 TIMES A WEEK



- Aerobic Exercises (at least 20 minutes)
- Roller blading
- Biking
- Skateboarding
- Rope climbing



- Swimming
- Running



- Recreational activities (at least 20 minutes)
- Volleyball
- Kickball
- Basketball
- Relay races
- Soccer
- Skiing

EVERYDAY

(as often as possible)



- Play outside
- Take the stairs instead of the elevator
- Help around the house or yard



- Bathe your pet
- Pick up your toys
- Walk to the store
- Go for a walk

Strenuous activity

Precautions

1. Check blood sugar before activity.
2. Avoid if blood sugar > 250 mg/dL
3. Keep glucometer and snack ready
4. Take snacks as recommended
5. Abdominal injection preferred

Concerns

Hypoglycemia

More insulin absorption
Calorie use

Hyperglycemia

Stress Hormones

Snacking recommendation

Duration of activity	Pre activity BS	Carbohydrate snack
Short duration Less than 30 minutes	Less than 100 mg/dL	15 gm carbohydrate
	More than 100 mg/dL	None
Moderate duration 30-60 minutes	Less than 100 mg/dL	25-50 gm plus protein
	100-180 mg/dL	15 gm carbohydrate
	180-240 mg/dL	None
Strenuous More than 1 hour	Less than 100 mg/dL	50 gm carb plus protein
	100-180 mg/dL	25-50 gm carb plus protein
	180-240 mg/dL	15 gm carbohydrate

Fact

No exercise should be done if blood sugar is more than 250
15 gram carb should be given for every 30 minutes exercise

Blood sugar monitoring

How often to check?

Before meal and bed time

More monitoring = Better control



Precautions

1. Clean hands, wipe spirit, water
2. Check for stick code if applicable
3. Insert test strip in the meter
4. Prick fingertip with lancet
5. Hold the finger till blood appears
6. Place drop of blood on strip
7. Record the results



Common errors

Too little blood- Low sugars

Wet finger- High sugars

Incorrect code- Erroneous reading

Error!

Here's what you did wrong...



CGMS

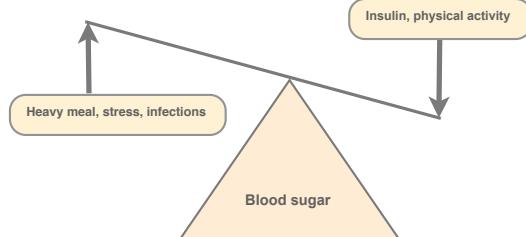
Continuous glucose monitoring system provides information about sugar readings every 5 minutes over 72 hours. It helps in modifying insulin dose.



What affects blood sugars?

Factors controlling blood sugars

Insulin
Physical activity
Diet
Stress
Infections



High blood sugars

Causes

Lumps at injection sites
Insulin omission
Erratic diet
Stress or infection

Action

Check injection sites
Increase insulin dose
Check diet
Treat stress or infection

Low blood sugars

Causes

More activity
Less intake
Malabsorption
Thyroid or adrenal problem

Action

Snacks during activity
Timely meals
Check for diseases
Reduced insulin dose

Targets and adjustments

Goals

Age group	Before meal	Post meal/bedtime	HbA1C
Less than 6 years	100-180 mg/dL	110-200 mg/dL	< 8.5%
6-12 years	90-180 mg/dL	100-180 mg/dL	<8.0%
13-19 years	90-130 mg/dL	90-150 mg/dL	<7.5%

Adjustment asper pre meal sugars

Pre meal sugar	Snack	Rapid acting	Long acting
< 70 mg/dL	Increase to 90 mg/dL	After meal	Decrease by 20%
70-90 mg/dL	None	After meal	Decrease by 10%
90-140 mg/dL	None	Before meal	Same dose
140-200 mg/dL	None	Before meal	Increase 10%
> 200 mg/dL	None	10% more	Increase 20%

Adjustment asper pre meal sugars

Post meal sugar	Post- pre meal sugar	Rapid acting dose
< 80 mg/dL	< -20 mg/dL	Reduce by 20%
80-100 mg/dL	-20-+20 mg/dL	Reduce by 10%
100-180 mg/dL	20-50 mg/dL	No change
180-250 mg/dL	50-80 mg/dL	Increased by 10%
>250	> 80 mg/dL	Increased by 15%

Insulin to carb ratio

Carbohydrate covered by 1 U insulin
 $ICR = 500/\text{Total daily dose}$

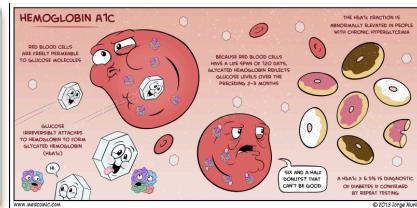
Insulin sensitivity

Glucose reduced by 1 U insulin
 $\text{Ins sens} = 1800/\text{Daily dose}$

HbA1c

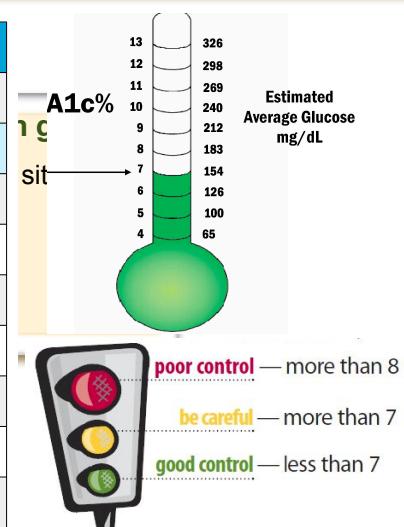
What is HbA1C?

HbA1c is a blood test that gives information about sugar control for the last three months.



A1C and mean blood glucose

HbA1C	Mean blood glucose
6.0%	126 mg/dL
6.5%	140 mg/dL
7.0%	154 mg/dL
7.5%	169 mg/dL
8.0%	181 mg/dL
8.5%	196 mg/dL
9.0%	212 mg/dL
9.5%	226 mg/dL
10.0%	241 mg/dL



Why is HbA1C important?

A1C levels predicts diabetic complications; Low HbA1C = Safety

Adjustment as per HbA1C

< 5.7%	5.7-7.5%	7.5-8.5%	8.5-10%	>10%
Non diabetic	Normal	Borderline	High	Very high
Reduce 10-15%	Same	Caution	Increase 5-10%	Increase 15-20%

Hypoglycemia- What, why and how?

What?

Blood glucose less than 60 mg/dL.
Low sugars is an emergency and
needs to be corrected immediately.



SYMPTOMS



Why worry?

Glucose is most important source of energy to the body.
Low glucose is much more harmful than high levels.

Night time hypoglycemia

Morning headache
Irritability, poor sleep
Poor school performance



Fact

In presence of symptom give glucose even if sugar not checked

Hypoglycemia- What to do?

I- Correct blood sugar

Immediately give 15-20 gm glucose
Give as glucose or sugar
Candies or chocolate take long time
and should be avoided.



II- Give maintenance food

Dextrose stays for only 30 minutes resulting in low sugars again. It should be followed by carbohydrate source (fruits, cereals)



III- Corrective measures

Check BS at 30 min and 2 hours
Reduce insulin the next day.
Reassess meal plan.
Snack for physical activity



IV Preventive measures

Frequent sugar monitoring
Timely meals
Exclude causes of hypoglycemia
Change insulin type or regimen



Severe hypoglycemia

What and when?

Blood glucose < 40 mg/dL

Unconsciousness, fits and inability to swallow are the features.

Such levels are very dangerous.



What to do at home?

Place in prone position

Avoid aspiration

Try to give paste of glucose if



Hospital care

Give IV dextrose 10%

2-5 ml per kg

Continue fluids till consciousness



Glucagon rescue

Glucagon rapidly corrects low blood sugars and can be life saving.



Fact

Severe hypoglycemia may be a life threatening condition

Sick day

Problems in sick day

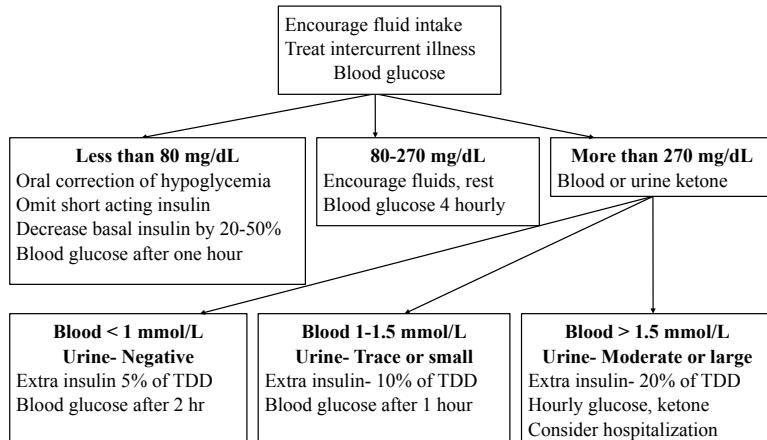
During fever and infections a child may develop both low and high



Sick day principles

1. Never stop insulin.
2. Blood sugar four hourly
3. Lot's of fluid
4. Reduce insulin if vomiting/diarrhea
5. Extra insulin if BS > 250 mg/dL
6. Beware of ketones

**KEEP CALM
AND
CHECK FOR
KETONES**



When to contact doctor?

Stomach pain, vomiting, fast breathing, unconsciousness

Diabetic ketoacidosis- What, why, how?

What and why?

High blood glucose cause collection of ketone resulting in acidosis

Why? Missed dose, stress, infection

Why worry?

DKA is the most deadly complication of T1DM and is life threatening if untreated

When to think?



What to do?

Check urine/blood ketone.

Give extra insulin.

Rush to hospital if high



Fact

DKA is a medical emergency and needs urgent hospitalization.

Associations

Celiac disease

Allergy to gluten (wheat)

Damage to intestine

Diarrhea and anemia

Respond to stopping wheat

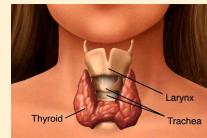


Hypothyroidism

Low thyroid

Weight gain

Poor attention



Symptoms of Celiac Disease in Children

- * Diarrhea or other intestinal problems
- * Foul-smelling, bulky stools
- * Loss of appetite and/or feeling full quickly
- * Weight loss or failure to gain weight
- * Failure to grow
- * Vomiting
- * Feeling tired
- * Abdominal bloating
- * Crankiness, irritability, personality changes, poor memory

Symptoms of Hypothyroidism

- * Increased sensitivity to cold
- * Constipation
- * Pale, dry skin
- * Poor growth
- * Delayed puberty
- * Delayed development of permanent teeth
- * Puffy face
- * Hoarse voice
- * Elevated blood cholesterol level
- * Unexplained weight loss
- * Muscle aches, tenderness, stiffness and/or weakness
- * Pain, stiffness and swelling in joints
- * Heavier than normal menstrual periods

Other associations?

Disease	Warning sign
Pernicious anemia	Weakness, lethargy, shortness of breath
Hypoparathyroidism	Low calcium, cramps, bone pain
Adrenal insufficiency	Increased urine, darkening of skin, weakness

Fact

Children with diabetes should be checked for thyroid and celiac

Complications

Why bother?

Biggest worry in type 1 diabetes
Organ damage is irreversible
Effects heart, eye, kidney and nerve

How to prevent?

Good sugar and BP control
Regular checkup
Timely treatment

Long term diabetic complications

Complication	What?	When to look?	What to do?
Retinopathy	Damage to retina No symptoms initially Can lead to blindness	First after 10 years and DM of 2-5 yr Then yearly	Retina checkup Better control Laser if required
Nephropathy	Kidney damage causing protein loss and renal failure	First after 10 years and DM of 2-5 yr Then yearly	Urine albumin BP, sugar control Treatment
Dyslipidemia	High cholesterol Causes heart disease	At diagnosis; then 2 yearly	Lipid profile Diet, treatment
Neuropathy	Damage to nerves Foot complications	First after 10 years and DM of 2-5 yr Then yearly	Foot examination Education, footwear



Followup

When to visit a doctor?

Monthly for three months
Then three monthly
If glucose become unstable
Sick day



What to look at?

Growth and puberty
Sugar logs
Insulin dose
Blood pressure
Injection sites.



Tests

HbA1C- Three monthly
Thyroid and celiac- Yearly
Eye, kidney- Yearly after 5 yr



Fact

Regular follow-up is mandatory for controlling blood glucose

Honey moon phase

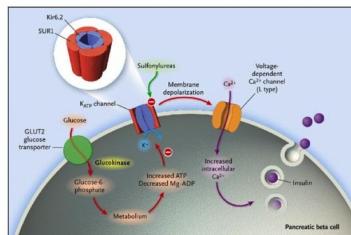
What?

Dramatic lowering of insulin need after stabilization of diabetes.



Why?

At onset of diabetes high sugar levels inhibit beta cell. With improvement in sugars these cells produce insulin with lower requirement of insulin.



How low, for how long?

Insulin dose may decrease to 0.2 unit/kg with some on long acting only. Very few children may come off insulin. The duration is usually 6-12 months.

What to do?

Keep monitoring blood sugar.
Don't rush to stop insulin.
Don't try alternate therapies.
Start insulin as sugars increase

I WANT A DIVORCE
FROM MY DIABETES!



Because after a brief
honeymoon period all we've
been doing is fighting with
each other.

diabetesduo.com

Fact

Honey moon phase is a coma and not a full stop
It does not mean end of diabetes

School and exams

What care to take in school?

Ensure good breakfast.
Readily available snack.
Inform school authorities.



School kit

Box containing 20-40 gm glucose
Glucometer
Identification tag



Examination precautions

Inform school in advance
Carry meter and glucose
Good snack before exam
Have glucose if feeling low



Annual/sports day

Reduce long acting a day before
Pack snacks for every 4 hours
Extra snacks as per activity
Check glucose before event



Fact

Informing school authorities is essential for children with DM

Travel

Why worry?

- Long travel time (hypoglycemia)
- Care of insulin (may get spoilt)
- Time change for international travel



What to do?

- Stock insulin, sticks and cool pack.
- Hypo kit (glucose tablets and snacks)
- Identification tag and card
- Contact details of parents/guardians



Train travel

- Timely snacks.
- Adequate cool packs.
- Check sugars regularly



Air travel

- Letter from doctor, prescription
- Never check in insulin (will freeze)
- Always take as carry luggage
- Meals local time, change later



Fact

Careful planning is essential for an enjoyable vacation

Career and marriage

My career options are limited?

With advancement in treatment children with diabetes are successful in most careers.



Which careers are not allowed?

Defense forces
Airline pilot
Truck drivers



Can I have normal marital life?

When treated properly children with diabetes have absolutely normal marital life.



What is the risk for my children?

The chance for type 1 DM in children is very low (4% for mothers and 7% for father with type 1 DM)



Fact

Women with T1DM should meet doctors before pregnancy planning

Adolescence

Why worry?

- Erratic meal patterns
- Risk taking behaviors
- High insulin requirement



Common problems

- Fluctuating sugars
- Worsening of HbA1C
- Greater chance of DKA



What to do?

- Re-education about diabetes
- Parental observation
- Frequent HbA1C and doctor visit



Avoid risk taking behavior

- Smoking (Vascular disease)
- Casual drinking (Hypoglycemia)
- Unprotected sex (use condom)
- Driving (Hypoglycemia risk)



Fact

Adolescence is the most difficult phase of type 1 DM treatment

Peek into the future

Stem cells

Stem cells are precursors of mature cells. Efforts are on to convert them into beta cells. This would provide unending supply of beta cells and cure T1DM. There is no proven role of stem cells in T1DM now.



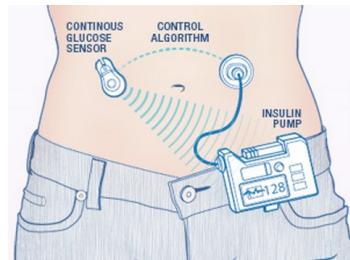
Oral insulin

Efforts of developing oral insulin are underway but not yet successful.



Closed loop system

Closed loop system works like pancreas by sensing blood glucose and delivering insulin as needed.



Fact

Future for children with diabetes is very bright, cure is at sight.

Type 1 DM- Problem to Solution

Useful links

<https://www.facebook.com/Diabo-World-664458853595300/>



The Facebook page for Diabo-World features a cover photo of six children with their faces painted in various colors. The page includes a profile picture for 'Explaining Diabetes' and a call-to-action button. Navigation tabs include Timeline, About, Photos, Likes, and More.



WE'RE
DIABO-WORLD
SERVING TYPE 1 DIABETIC CHILDREN

<http://www.diaboworld.com/>



Anurag Bajpai View as: Yourself ▾

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 GROW India IIT Kanpur Design Workshop 12 views • 3 weeks ago	 IIT K Design workshop 15 views • 3 weeks ago	 Diabetes in children is not just a disease 14 views • 3 weeks ago	 GROW India Type 1 DM empowerment program final 14 views • 3 weeks ago	 GROW India Type 1 DM empowerment program 49 views • 1 month ago	 Type 1 DM is not just a disease 8 views • 1 month ago
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<https://www.youtube.com/channel/UCRM4NL33J33YErh3939cJLA>

Type 1 DM- Problem to Solution



The image shows the homepage of the GROW India website. At the top left is a large green flower logo. To its right, the word "GROW India" is written in a large, white, sans-serif font. Below it, the text "Growth & Obesity Workforce" is displayed in a smaller, handwritten-style font. A horizontal navigation bar below the main title includes links for Home, About, Executive Members, Kids Health, Documentation, Media, Case Study, Contact Us, and Login. Two main images are featured: on the left, a group of diverse children smiling with the text "Road To Growth" overlaid; on the right, a cartoon illustration of five children of different ethnicities holding a banner that says "Puberty". Below the images, the website's URL "www.grow-india.org" is centered. The page is divided into several sections: "PEDIATRIC EMPOWERMENT" (with a subtext about child surroundings), "PEDIATRIC ENDOCRINOLOGY" (with a subtext about pediatric endocrinology), and "SCHOOL INITIATIVES" (with two sub-points: Awareness and Empowerment). At the bottom of the page is a blue footer bar with icons for a menu, user profile, message, and globe, followed by the text "GROW India".



A screenshot of a Facebook page for "GROW India". The page header includes the GROW India logo and the text "Growth & Obesity Workforce". The main post on the timeline shows a photograph of a formal event with a speaker at a podium and an audience seated at tables. Below the photo is the page name "GROW India" and the text "309 likes · 96 talking about this". A blue "Like" button with a checkmark is visible. The bottom of the screenshot shows a sidebar with community information, a "Normal growth" chart, a calendar icon with the number "31", and a "309" like count.

GROW India

Growth & Obesity Workforce



Together we win

GROW Society Publications,
Kanpur, 2017

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