

Management of Childhood Obesity

Education booklet for Children and Parents



All India Institute of Medical Sciences
Department of Pediatrics
2009



Preface

This booklet is meant for free distribution to obese / overweight children presenting to the Pediatric Endocrinology Clinic at Department of Pediatrics, AIIMS, New Delhi. The aim of writing this booklet is to increase awareness and motivate children and their parents in the management of obesity.

Vandana Jain

Assistant Professor
Division of Pediatric Endocrinology

Anuja Agarwala


Senior Dietitian
Division of Pediatric Nutrition
& Dietetics

Department of Pediatrics

All India Institute of Medical Sciences,
New Delhi - 110 029.

Assisted by

Ms. Kiran Rai, Ms. Meenu Khaneja
(Short term trainees)



1. Introduction
 2. What is Obesity?
 3. Causes of Obesity
 4. Problems of Obesity
 5. How to control Obesity?
 - 5.1 Eat Balanced Diet
 - 5.2 Importance of fibre in the Diet
 - 5.3 Avoid Junk Food/ Fast Food
 - 5.4 Ways to modify Diet
 - 5.5 Regular Exercise
 - 5.6 Behavioral Therapy
 6. Important things to remember
 7. One day's diet plan
 8. Frequently asked questions
-

1. Introduction

Increasing prevalence of obesity in children has become a major cause of concern worldwide. School based studies from Delhi have shown that 17% children are obese. Importantly 50 - 80% of obese children become obese adults and all complications of adult obesity are made worse if the onset of obesity is in childhood.

2. What is Obesity?

Obesity is a condition of excess fat deposition in the body which leads to impaired health.

How do we measure obesity?

Body mass index (BMI) is a useful index to assess overweight and obesity in children.

Formula for BMI = Weight (Kg) ÷ Height (m)²

For example :

If you want to assess the weight of your 8-year old (male) child

Step 1 : Measure boy's height

If the height is 120 cm (i.e. 1.20 m)

Step 2 : Multiply 1.20 m with 1.20 m to square it

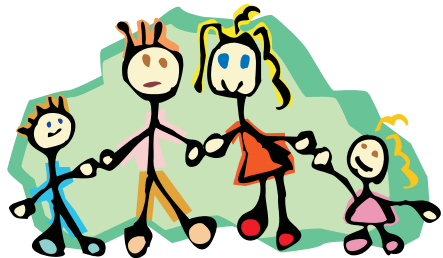
$1.20 \times 1.20 = 1.44 \text{ m}$

Step 3 : Measure Child's Weight

If the Weight is = 30 Kg

Step 4 : Insert both numerical in the formula

$\text{BMI} = 30 \div 1.44$
 $= 20.8$



Step 5 : Now see the BMI cut-offs for boys and girls of different ages from the table given below. The list gives the measure of overweight and obesity for children according to their age.

Table : BMI Cut-Offs for overweight and obese children at different ages

Age (years)	Girls			Boys		
	Normal range	Overweight	Obese	Normal range	Overweight	Obese
8	14.1-18.2	18.3	20.6	14.4-17.9	18.0	19.7
9	14.4-18.9	19.0	21.5	14.6-18.4	18.5	20.5
10	14.8-19.7	19.8	22.5	14.9-19.1	19.2	21.4
11	15.3-20.7	20.8	23.7	15.3-19.9	20.0	22.5
12	15.9-21.7	21.8	24.9	15.8-20.8	20.9	23.6
13	16.6-22.6	22.7	26.2	16.4-21.7	21.8	24.8
14	17.2-23.4	23.5	27.3	17.0-22.6	22.7	25.9
15	17.7-24.0	24.1	28.2	17.6-23.5	23.6	27.0
16	18.1-24.4	24.5	28.8	18.2-24.2	24.3	27.9
17	18.4-24.7	24.8	29.2	18.8-24.9	25.0	28.6
18	18.5-24.9	25.0	29.5	19.2-25.4	25.5	29.2

Reference : WHO cut off 2007

Step 6 : You can see from the table that 8 year old boy with BMI of 20.8 is under obese category.

If the BMI ranged between 18 to 20, then the boy would have been categorized as overweight. BMI below 18.0 will be considered normal for him.

Like wise, by using BMI formula and the above table, obesity in children can be measured.

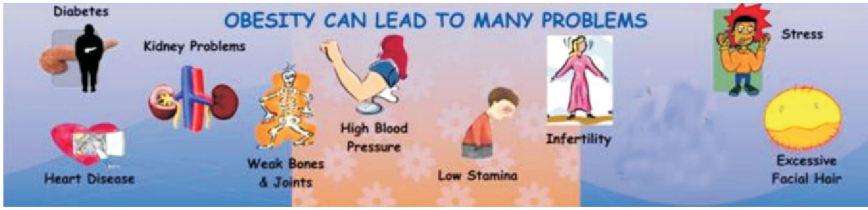


3. Causes of obesity in children

Obesity has many causes. One of the important reasons for increasing prevalence of obesity among children is the **change in lifestyle and eating habits** that has occurred over the past 10-15 years.

- **Unhealthy eating patterns** - Traditional nutritious foods are being replaced by energy dense, fat and sugar rich processed foods with greatly increased portions.
- **Sedentary habits** - Television and movie watching, video games, internet gazing and telephone gossip sessions are now important activities of children.
- **Inadequate physical activity** - Games or physical training sessions are restricted or nonexistent in many schools. Some schools do not even have playgrounds due to scarcity of space.
- **Burden of studies** - Children are forced to use their play time for additional studies/ tuition classes due to intense competitions for admission to schools and colleges.
- **Safety** - Due to increasing number of vehicles and unsafe roads children are discouraged from walking or cycling to schools.
Working parents - Both working parents and lack of parental time to supervise play are all part of a new lifestyle which promotes obesity.
- **Reward & punishment** - While food items (e.g. chocolates, ice creams) are offered as reward, exercise is often meted out as punishment (e.g. running ten rounds in the ground) which is a wrong reward - punishment strategy.
- **Faulty eating habits** - Child will definitely become obese if he eats more than his capacity and predominantly depends on "fast food or junk food".
- **Family history of obesity** puts the child at risk of becoming obese.
- **Hormonal Imbalance** - Lack of thyroid hormone or excess of Cortisol hormone in children may also cause obesity. Hormonal imbalances also lead to decrease in height potential.
- Many **genetic reasons** may also be the cause of obesity.
- **Psychological reasons** - Many affected children suffer from poor self-esteem and frequent mood swings. Lack of parental love and affection can also lead children to obesity.

4. Problems of obesity



Obesity can cause a host of problems for affected children. Some of the important ones are :

1. **Diabetes**
2. **Heart disease**
3. **Hypertension**
4. **Weak bones and joints**
5. **Physical weakness and fatigue**
6. **Mental, Psychological stress and low self esteem** : Many children suffer from low self esteem due to obesity and they begin to perform poorly at studies as well as in games compared to other children.
7. **Hormonal imbalance** : Some children show an initial rapid gain in height and early onset of pubertal changes but the final height achieved often falls short of their genetic potential.
Some overweight adolescent girls become affected by a condition known as polycystic ovary disease characterized by increased growth of facial hair, acne and infrequent menstruation. If untreated, this can lead to infertility later.
8. **Metabolic syndrome** : Up to 30% of overweight adolescents are affected by this condition. The metabolic syndrome includes diabetes, high blood pressure, triglycerides, high levels of low density lipoprotein (bad cholesterol) and low levels of high density lipoprotein (good cholesterol) in the blood. All these factors put the individual at increased risk for cardiovascular disease.

Recent studies have shown that children who have lesser weight at birth but have a rapid weight gain later, are at higher risk of complications of obesity like diabetes and heart disease.

5. How to control Obesity?

Balance your diet and activity

1. Offer balanced and nutritious diet to your child which is essential for ensuring proper growth. Keep your child away from burger, chowmein, pizza (**fast Food and Junk food**).
2. Encourage your child to exercise and play outdoor games regularly. Discipline the entire family so that your child also gets disciplined. Make a time schedule for various activities Eg; time slot for outdoor games, homework, studies, eating , watching T.V., sleeping etc.

5.1 What is balanced diet?

Diet is called “balanced” when

- all the nutrient such as carbohydrates, protein, fat, vitamins & minerals are present in required amounts.
- at least one or more food items are included from each of the food groups.
- all food items are included in the diet in correct amount.

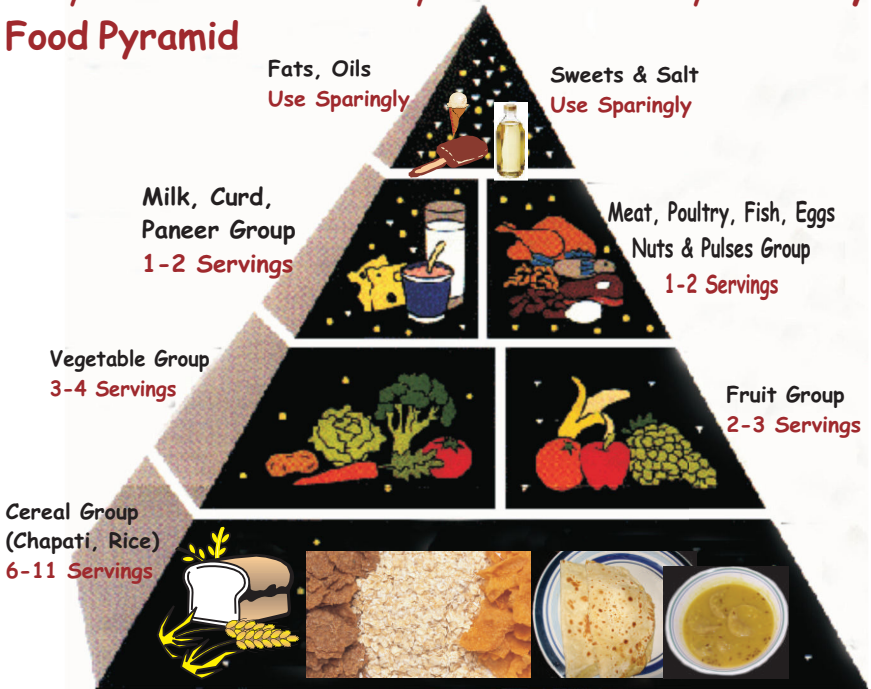
Food is divided into 6 major groups :

- 1) Milk and milk products like paneer, curd etc.
- 2) Meat, fish, chicken, egg and pulses
- 3) Cereals and root vegetables
- 4) Seasonal vegetables and fruits
- 5) Oil/ ghee/ Butter
- 6) Sugar/ Jaggery

Note : Drink 8-10 glasses of water per day.

Use less salt while cooking.

Method to include all the six food groups in your daily diet can be easily understood by **Healthy Food Pyramid**



One serving means.....

Cereals

2 small pulkas or 1 big chapati or 1 katori Upma
1 katori cooked rice or poha or 2 small Idlis or 1 dosa

Fruits and Vegetables

1 medium size apple/guava/chickoo / $\frac{1}{2}$ banana
1 katori green leafy vegetables or $\frac{3}{4}$ katori of seasonal vegetables
 $\frac{1}{2}$ katori potato

Milk and its products

1 glass (250 ml) or 1 katori curd or 2 small pieces of paneer

Pulses and Nuts

1 katori dal / 10-12 almonds

Meat / Fish / Poultry

1 egg or 1 small piece of fish or chicken

Fats and sugars

1 tsp (5 gm) : Not more than 15-20 g fat (<3-4 tsps) and 10-15 g sugar (<2-3 tsps) is recommended for one person in a day.

Calculate fat allowance for your family

For one person, maximum 500 ml of fat (oil, ghee, butter) should be used for one month. If there are 5 family members,

$$\begin{aligned}\text{Allowance of fat will be} &= 500 \text{ ml} \times 5 \\ &= 2500 \text{ ml (2.5 Kg)}\end{aligned}$$

This means, 2.5 Kg of fat should be used for the entire family in one month.

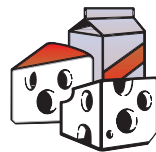
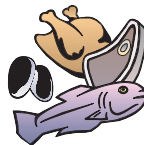
Not more than $\frac{1}{4}$ th part of 2.5 Kg should be in the form of ghee and butter and $\frac{3}{4}$ th part as refined vegetable oil or mustard oil.

i.e. $\frac{1}{4}$ th part of 2.5 Kg = 600 ml ghee and butter

$\frac{3}{4}$ th part of 2.5 Kg = 1.9 kg refined oil

Fat content of the diet can be further reduced :

- Use non-sticking pans for cooking.
- Prefer boiled, roasted, steamed, grilled food instead of fried foods
- Use toned or double toned milk.
- Either one egg or 50 to 100 gm of meat, fish or chicken, 2 to 3 times in a week is sufficient for one person. For children who are vegetarian, 25 - 30 gm (handful) of dry nuts such as almonds, pistachios and walnut can be offered.



5.2 Importance of fibre in the diet

Fibre is that portion of vegetables and fruits which cannot be digested by the enzymes produced in our gut but fibre is important to keep us healthy. Fibre improves digestive functions by eliminating all harmful substances from our body and keeps the intestine clean. Fibre absorbs water, stays in the intestine for a long time and provides satiety. Fibre also helps to maintain our blood sugar, blood cholesterol and weight.

Improve your fibre intake

Food groups	Choose-fibre rich food items	Restrict
Cereals	Wheat, wheat flour with husk (chokkar), maize, bajra etc. Avoid sieving the flour. Whole wheat bread/ brown bread, Unpolished rice.	Refined flour (maida), White bread, Polished rice
Pulses	Whole pulses (sabut dal). Dal with chilka such as chana, sabut, moong, rajma, lobhia, etc. Sprouted dal.	Washed pulses (Dhooli dal)
Vegetables	All seasonal vegetables (beans, peas, bhindi etc). All green leafy vegetables (palak, methi, bathua, sarson etc). raw vegetables (salad)	Root vegetables (potato, arbi)
Fruits	Fresh fruits which can be eaten with seeds, skin and pulp such as anar, guava, apple, pear etc.	Banana, mango, chiku, Lichi, grapes. Fruit juice Tinned/canned fruits.

5.3 Avoid junk food / fast food

Foods rich in fat, sugar, salt and empty calories are called **Junk foods** or **fast foods**. Excess and regular consumption of these foods lead to obesity, high blood pressure, diabetes and other non-communicable diseases. High content of salt and sugar in foods can damage teeth or cause dental caries. Children get attracted to tempting advertisements of chips, chocolates, burgers, soft drinks etc on TV and magazines. Since the nutritional value of junk foods is very low, children should be strongly discouraged to eat these foods, and provided nutritious snacks like sprouts, fruit chat & salads.

How can we find out the nutritive value of our diet?

Quality of food or diet defines its nutritive value. For example :

Food groups	Foods of good quality	Food of poor quality
Milk and milk products	Toned milk	Full cream milk, Buffalo's milk
Meat and meat products	Fish, Chicken without skin, egg white	Egg-yolk, red meats such as liver, kidney etc.,
Cereals	Whole (sabut) cereals such as atta, atta with husk (chokkar), maize, bajra etc. Chapati without oil/ghee.	Refined wheat flour (maida) or foods made out of maida such as bread, bhatura etc.
Pulses	Sabut dal, dal with chilka and sprouted dals.	Washed pulses (dhuli dal)
Vegetables	All seasonal vegetables	Excess consumption of root vegetables such as potato, arbi, jimikand etc.
Fruits	All fresh fruits, fruits which can be eaten with their skin (apple, guava, pear) and seeds (anar, guava)	Sweet fruits such as mango, chiku, lichi, banana and grapes. Fruit juices (fresh as well as preserved)
Sugar	Gur, honey	Glucose, sugar
Fat	Refined vegetable oils such as soyabean oil, ground nut oil, mustard oil, rice bran oil	Ghee, butter, vanaspati. Coconut oil, palm oil

5.4 Modify your diet

There are a number of specific treatment approaches, one of which is the traffic light diet with its child friendly approach to categorizing food into **RED (Stop)**, **YELLOW (Slow Down)** & **GREEN (Go)**

**Avoid
completely**

- * Fried foods – puri, paratha, samosa, pakora, potato chips, namkeen, bhujia, tikki, dalmoth, mathi, fried papad, patties, burger, pizza.
- * Sweets – cake, pastry, toffees, honey, Jam, jelly, Chocolates, ice-cream, methai.
- * Full cream milk, cream, processed cheese, butter, ghee.
- * Red meats, butter chicken, fried fish, mutton, ham, egg yolk
- * Fruit juices, tinned and canned food products.

**Eat in
prescribed
Or limited
quantity**

- * Milk and milk products (curd, paneer)
- * Meat, egg
- * Cereals and pulses
- * Banana, chiku, lichi, mango, grapes
- * Root vegetables (potato, arbi)
- * Sugar and fat
- * Biscuits, bhutta, popcorn, pickle, roasted papad

**Eat
liberally**

- * All seasonal vegetables
- * Green leafy vegetables (saag)
- * Raw vegetables (salad)
- * All whole fresh fruits, fruits with skin (apple, guava, pear) and seeds (anar, guava). Low sugar fruits (watermelon, papaya, muskmelon) and fruits with pulp and fiber (oranges, mausambi).
- * Puffed rice, roasted chicken and fish
- * Salted lemon water, vegetable soup and plain fresh water.

5.5 Regular Exercise

It is difficult to reduce weight just by modifying your diet. Along with eating a balanced diet, it is also essential to do regular exercise. Exercise keeps the body fresh and active. It helps to reduce weight and builds resistance to fight against the diseases. Whatever we eat in the whole day, it is important to balance it with exercise i.e. calories we get from food get used by exercise. For children, it is advisable to spend at least 2 hours daily in exercise or some physical activity or sport. If the child is not used to exercising, start with 5-10 minutes of scheduled outdoor physical activity such as brisk walking. Gradually, increase the time of exercise to 2 hours in few weeks. Increased activity level is essential to loose weight.

Q. What type of exercises children can do?

There are many type of exercises children can do, such as

- Brisk walking, Jogging, Jumping, Climbing, skipping
- Cycling, Skating, Swimming, Aerobics, Dancing, Yoga
- Football, Tennis, Volleyball, Badminton, Hockey, Basket ball

Children can choose one or more exercises or physical activities of their choice and include in their daily routine. Not only children but all the family members should make cautious effort to change their lifestyles. This will motivate children to make daily exercise their habit.

In addition to this, one can include physical activity in daily household work to add up to physical activity such as

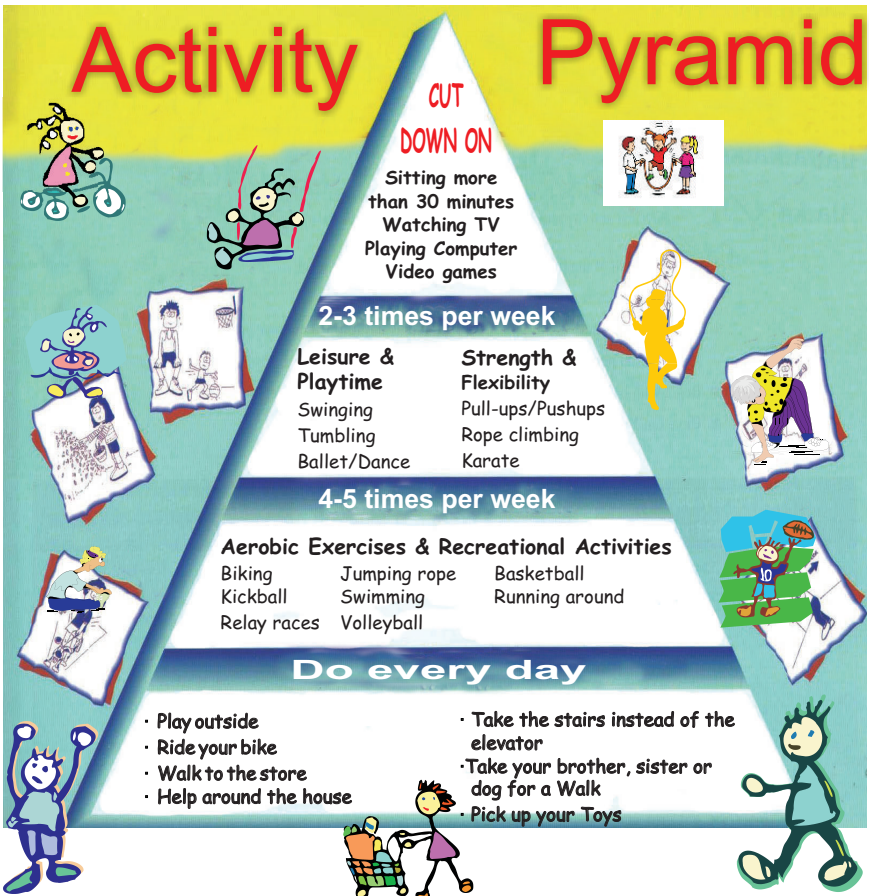
- Walk inside the house instead of sitting at one place for a long time.
- Climb stairs
- Go for a stroll after dinner
- Sweeping the house
- Cleaning the table
- Getting yourself drinking water

Children should be told about the benefits of physical activity:

- Maintains weight
- Keeps you physically fit
- Makes your skin glow
- Keeps the bones strong
- Makes the muscles strong
- Increases concentration
- Prevents deadly diseases
- Helps sleep soundly.

Restrict sedentary behavior

- Watching T.V. for a long time
- Long Telephone conversations
- Internet surfing for more than 2 hours daily
- Too many tuition classes.



5.6 Behavioural Therapy

Behavior modification includes some of the following initiatives :

- Child is encouraged to take small bites, chew longer and eat slowly by putting the utensil down between bites.
- Rewarding child with food could be very harmful. Reward compliance with excursions or sport equipment but never food.
- Make cautious effort to avoid watching T.V. while eating.
- Restrain temptation of buying high calorie foods from the market.

Children not complying well on the diet and activity instructions need help of psychologist who can help modify the behavior of the child.

6. Important things to remember

- Children should be taught to eat homemade, balanced and nutritious food from initial years of life.
- All family members should eat same kind of food and try to sit together to eat at meal times. Your child's eating behavior can change, only if everybody in the family cooperates with him by changing their own food habits.
- Bring variety in homemade food especially snacks so that your child is not tempted to eat out.
- If your child refuses to eat nutritious food prepared at home, try and change the form, size or shape of the food eg; if the child does not like saag (green leafy vegetables), then stuff green leafy vegetables in chapatti to make nutritious roti.
- Keep a control on eating ready to cook food, preserved food and eating out.
- Daily schedule of your child should include three major meals i.e. breakfast, lunch and dinner and at least two - three nutritious snacks or small meals in between i.e. midmorning, evening snack and bedtime. It is better to eat small quantity of food each time divided into 5-6 meals over the day keeping a gap of $2\frac{1}{2}$ to 3 hours between meals. Avoid eating just 3 meals and of huge portion size.
- Dinner should be eaten 2 hours before going to sleep.

-
- Create a balanced diet containing vegetables, fruits, whole grains, nuts, fiber, lean meat, fish and low fat dairy products. It is important to include food items from each of the food groups (refer food pyramid) to make the diet balanced and nutritious.
 - Eat food rich in fiber. Eliminate all sugary drinks (including juice) and replace with water, non-caloric beverages and low fat or skimmed milk
 - Do not allow your child to eat while watching TV. Encourage your child for outdoor activities rather than watching TV for long hours.

Bring discipline in your lifestyle to maintain weight and to keep yourself healthy and disease free.

7. One day's sample diet chart

Age: 14 years old boy

Weight: 65 Kg

BMI= 27

Height: 155 cm

Our Assessment

- Ideal Body weight of this child is 50 Kg for 155 cm height.
- His normal calorie requirement for age is 2450 Kcal/ day.
- This child is at the critical age when lots of changes are taking place in terms of his physical growth and development. Therefore, drastic reduction in calories is not advisable. Normally, 200 - 400 Kcal (10% to 20%) is reduced from child's ideal diet depending on his usual intake both in terms of quantity as well as quality of food i.e. 1970 Kcal which is 20% reduction.
- Besides reduction in calories, quality of diet is also changed i.e. fiber is increased, fat is reduced and proteins are advised on slightly higher side. Child is encouraged to consume lot of fruits and vegetables.

Diet Plan

Food Group	Amount (g)	Household measures
Milk, Toned	500 ml	2-2½ glass
Pulses	60 g	2 katori
Cereals	250 g	-
Green Leafy Vegetable	125 g - 150 g	1-1½ katori
Seasonal Vegetable	300 g	2-2½ katori
Root vegetable	50-100 g	-
Fruit	200 g	Two medium size
Fat	20 g	4 tsps
Sugar	15 g	3 tsps
Almond/Walnut/groundnut	10-15 g	handfull

Meal Plan

Meal time	Distribution of food items
Breakfast	Milk - 125 ml; 1 chapati with vegetable ; 1 fruit OR Milk - 125 ml; 30 g cornflakes/ daliya with vegetables; 1 fruit
Mid morning	2 chapatis stuffed with 15 g paneer; vegetables OR Sandwich/ patty (3 bread pieces + 15g paneer + vegetable - *use whole wheat bread
Lunch	2 chapatis; 1 katori boiled rice; 1 katori dal; 1 katori vegetable; salad
Teatime	Milk - 150 ml; sprouted or germinated food (eg; 1 plain dosa or 2 Idlis or upma or poha or dhokla) *Use vegetables in the preparation or have salad along with the snack
Dinner	3chapatis; 1 katori vegetable; salad; 1 fruit
Bedtime	Milk - 125 ml with 20 g daliya Or 3 salted biscuits

Note : chapati = Wheat flour + kala chana with husk (3:1)

8. Frequently asked questions

My child is obese. What should I do?

Management of established obesity in children needs a concerted and a sustained effort from a team of experienced health professionals. Your child needs guidance of the specialists - doctor, dietitian, physical activity instructor and psychologist. Keep in constant touch with them, follow up in the clinic regularly and comply with the instructions. Keep a record of diet, exercise and weight. In addition to the care of specialists, family support is very crucial in management of obesity.

Can some drugs be used to decrease obesity?

In selected cases in which supervised lifestyle interventions fail, some drugs can be used. However, most anti-obesity drugs are as yet not approved in children below the age of 16 years.

Are there any investigations that my child should undergo?

Some of the investigations that your doctor is likely to order are:

Thyroid profile

Lipid profile

Blood sugar (fasting and post-prandial)

Liver function tests

Other investigations like kidney function tests, serum cortisol, HbA1c, plasma insulin, oral glucose tolerance test, ultrasound examination of liver or ovaries may be ordered in selected cases.

My child has been trying since 2 -3 months to loose weight but with little success. We are getting discouraged!

Trends in weight loss and effects of intervention need to be followed up regularly with your specialists. Motivation of the child on an ongoing basis is essential. Even small successes matter and weight loss of as little as 5-10% results in significant improvement in cholesterol, blood pressure and blood glucose. Continue your whole-hearted efforts to succeed.

How much weight should my child loose and how long is the management of obesity.

Normally, child should loose 1-2 kg weight in a month. Management of obesity will continue till your child reaches his normal weight for age. Healthy life style should be followed by the entire family life long.

