



# Low Cost Nutritious Supplements

## Table of contents

1. [Food needs of Infants and Children](#)
  - i. [The infant](#)
  - ii. [The pre-school child](#)
  - iii. [Principles governing the formulation of the recipes](#)
2. [Recipes suitable for infants](#)
  - i. [Methods of preparing different types of recipes](#)
  - ii. [Adult food modified to suit children's' needs](#)
  - iii. [Protein-rich supplements that may be added to the family diets](#)
  - iv. [Ready to use infant weaning foods](#)
  - v. [Method of feeding](#)
3. [Recipes suitable for preschool children](#)
4. [Nutritious snacks for infants and preschool children](#)
5. [Related resources](#)

## Food needs of Infants and Children

During the first few years of life, the body grows at a very fast rate. The baby weighing on the average about 3 kg. At birth doubles its weight by 6 months. The weight touches 9 kg. By 1 year. Infants and children are very active and they spend a lot of energy. Therefore, need large amounts of body building and energy-giving foods rich in proteins and calories.

Many studies have been carried out at the National institute of Nutrition and other research centers in the country on the nutritional requirements of infants and growing children. Based on these investigations, the following intakes of protein and calories have been recommended.

Age Group	Expected Body Weight (approx.) kg.	Calories Kcals.	Protein grams.
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2.	6 months to 1 year	7-9	800	13
3.	1-3 years	9-13	1200	18
4.	4-6 years	15-17	1500	22
5.	7-9 years	18-21	1800	33
6.	10-12 years	23-28	2100	41

### The infant

During the first four to six months of life, breast milk usually supplies all the nutrients needed by the baby. The child grows well, depending entirely on mother's milk during this period.

Breast milk may still be available to the infant even after the sixth month. But this is not sufficient by itself to meet the increasing nutritional needs of the growing baby. Supplementary foods supplying the shortfall in the nutrients are, therefore, necessary from this period of life. But then, what types of foods should be provided to the infant to supplement mother's milk? In the following pages, an attempt has been made to suggest a few recipes to meet this need. In making these suggestions, the following points have been kept in mind.

1. The recipes must be based on locally available foodstuffs.
2. The cooking methods must be simple.
3. The cost should be minimal.
4. The recipes should be acceptable in taste, consistency and bulk to the child as well as the mother.
5. Together with whatever breast milk is available, the suggested recipes should be able to meet the need for calories, proteins and other nutrients essential for the child.

### The pre-school child

Generally, by the time the child is 1 to 1-1/2 year's old, breast milk. May not be available to it. Such a child will. Therefore have to depend solely on other foods. By now, the child would have cut teeth and learnt to eat by itself and has access to the adult type of foods. But these adult foods are usually based on rice, wheat or other common cereals. They are relatively low in proteins and only small quantities are usually given to the child. Paradoxically, this is the time when the child needs more nutritious foods supplying protein and calories. If this is not provided, the ill effects are felt not only immediately but also in later life. A simple experiment carried out at the National Institute of Nutrition illustrates this point.

Two groups of young rats born to the same mother were given two different diets. One group was fed nutritious foods throughout while another group was deprived of such nutritious foods during the post- weaning period i.e., immediately after the young ones were weaned from their mothers. After just four weeks of deprivation. The latter Group was also given adequate quantities of wholesome. Nutritious foods. Even after 1-1/2 - 2 years of feeding, the group which was not given nutritious foods at the crucial time immediately after weaning could not catch up in growth with the other group of animals. In the human situation, this critical period when adequate quantities of nutritious food is essential, corresponds to the first 3-4 years of life.

Therefore, in the post-weaning period, proper nutritional care of the child is essential to ensure normal growth not only then but even in later life. Recent experimental evidence suggests that malnutrition early in life can not only affect physical growth but may also interfere with proper mental development. This emphasizes the need for providing nutritious foods for the pre-school children from the age of one year onwards.

Some recipes suitable for feeding the pre-school child (in the age group of 1 to 5 years) are presented in the later pages. The criteria used in developing these recipes are the same as for recipes meant for infants.

### **Principles governing the formulation of the recipes**

As mentioned earlier, an infant aged 6 months to 1 year requires about 13 g. of protein and 800 calories daily. Breast-milk that may be available to them provides approximately 5 g. of protein and 300 calories. The recipes now suggested as weaning foods for the infant are so planned as to supply the rest of the requirements.

Likewise, a pre-school child, depending upon his age, requires daily about 20 g. of protein and about 800-1,500 calories. The supplements suggested here are expected to provide about half the total daily requirement of protein and about 1/3 the total caloric needs.

The additional protein needed may be supplied by well-known protein-rich foods like milk, meat, fish and egg or pulses and other less expensive foods. Since the purpose of this brochure is to present how best to provide supplementary foods at minimal cost, recipes involving the use of expensive foods like meat, fish, egg and milk have not been included here. The additional nutrients required have, therefore, been planned to be supplied through common cereals, pulses. Nuts and oilseeds which are about the cheapest sources of proteins and calories in our country.

The cereals and millets commonly used in various regions of our country are rice, wheat, Jowar, Bajra, ragi, maize etc. Cereals in general provide about 350 calories per 100 g. They are however, relatively poor sources of protein, the content varying from about 7% in rice to about 12% in wheat. The protein content of the millets Jowar, Ragi and bajra fall in between. Pulses are about the richest natural sources of proteins. They contain about 22 to 25% protein and like cereals. Supply about 350 calories per 100 g. The pulses commonly used are Bengalgram, Greengram, Blackgram, Redgram, Lentil etc.

Oilseeds have a double advantage. They are good sources of protein and are also rich in calories because of their high oil content. Meals obtained after extraction of oil from common oilseeds like groundnut, gingelly and cottonseeds are concentrated sources of protein, containing as much as 50%. The use of these meals for human consumption has, therefore, been advocated in recent times. However, oilseed meals obtained from the country ghatis and oil mills usually contain grit and other unwanted material and are therefore not fit for human use. Recent advances in oilseeds technology have provided methods to make the oilseed meals acceptable to humans. So these oil meals can be used in human diet as valuable protein rich supplements.

A growing child requires apart from protein and calories, other nutrients such as calcium and vitamin A. Appropriate use of foods like green leafy vegetables and skim milk powder takes care of these requirements and so these foods have been included in some of the formulations. Since supplies of skim milk are also limited in the country, recipes not involving use of skim milk have also been suggested.

## **Recipes suitable for infants**

Supplementary feeding of infants is being carried out in our country in many ways. Most often, a part of the food prepared for the other members of the family is fed to the infant. But the usual family diets in our country are poor in the nutrients essential for the proper growth of the infant. Then how can we ensure adequate nutritional care of the infant? Feeding preparations specially developed to meet the nutritional needs of the infant in full is the best solution. But there may be some practical difficulties in such an approach. Hence the next best way is to see how far the food generally prepared for the whole family can be used to feed the children also. This can be done in several ways:

1. Following the traditional infant feeding practices, but with enrichment of the food with additional nutritious supplements prepared at home (or)
2. By a wise choice of the quantities to be fed to the child, of the foods cooked for the entire family.

In view of these difficulties, there is a need to develop formulae for wholesome infant foods based on locally available foods. Using Minimal amounts of milk powder, these foods can be prepared without much elaborate processing. These should be capable of being prepared in bulk at home or at the community level as a small scale industry. Such preparations can then be used like commercial preparations. They will also be especially useful for working women who may be hard pressed for time to prepare foods specifically for the child every day.

### **Methods of preparing different types of recipes**

#### **Some recipes which can be prepared daily specifically for the infant**

A recipe providing about 450-500 calories and 12-14 g. of protein is required to be used as a supplement to breast milk to feed the older infant. The quantity is for the whole day per child and the cooked preparations can be distributed in several feeds throughout the day. But in many supplementary feeding programmes. Due to paucity of funds, it has not been possible to provide supplement in amounts to supply 500 calories daily. In many of these programmes. Supplements providing only about 300 calories and 9-10 g. protein are possible. The recipes described here have been so formulated that they meet the needs of administrators in charge of such programmes and provide about 300 calories and 9-10 g. of protein. When funds permit, it may be desirable to increase the quantities by about 50% to meet the nutritional needs of the infants in full.

#### **WHEAT GRAM PORRIDGE**

##### **Ingredients**

## **Ingredients**

Roasted wheat flour	25 g.( 1 1/2 tablespoons)
Powdered, roasted Bengalgram	15 g. (1 tablespoon)
Powdered, roasted groundnut*	10 g. (2 teaspoons)
Sugar or jaggery	30 g. (2 tablespoons)
Spinach (or any leafy vegetable)**	30 g.

## **Method**

- Roast groundnut. Wheat and Bengal gram and powder them.
- Mix the wheat, Bengal gram and groundnut powders and prepare a batter by addition of jiggery, dissolved in a suitable amount of water and made into a thin syrup. Boil spinach in water till soft, mash and strain through a clean cloth.
- Add the vegetable juice to the batter and cook for a few minutes with continuous stirring till semi-solid.

\* There is an important point to be kept in mind when groundnuts are used in the different food preparations. Only healthy looking nuts should be used. Groundnuts which are covered with fungus, shrivelled and discoloured should be rejected. since their use can lead to health problems.

\*\* It is desirable to add green leafy vegetables like spinach (palak) to the infant's diet. Greens provide calcium and vitamin A both of which are essential for proper growth. If greens are not available, ragi which is rich in calcium can be included. This however will not provide vitamin A. In such a case, the infant must necessarily get vitamin A from some other sources. A teaspoonful of shark-liver oil once a week will ensure that he gets enough vitamin A.

## **RICE PORRIDGE**

### **Ingredients**

Rice	30 g. (2 tablespoons)
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Powdered, roasted groundnut*	15 g. (3 teaspoons)
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Powdered, roasted greengram or redgram dal	10 g. (3/4 tablespoon)
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Sugar or jaggery	30 g. (2 tablespoons)
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Spinach (or any leafy vegetable)**	30 g.
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### **Method**

- Cook the rice.
- Add to the cooked rice the pulse and groundnut powder.
- Boil leafy vegetables in water till soft, mash and strain through a clean cloth and add the juice to the above mixture.
- Add sugar or jaggery and cook for a few minutes.

\* There is an important point to be kept in mind when groundnuts are used in the different food preparations. Only healthy looking nuts should be used. Groundnuts which are covered with fungus, shrivelled and discoloured should be rejected. since their use can lead to health problems.

\*\* It is desirable to add green leafy vegetables like spinach (palak) to the infant's diet. Greens provide calcium and vitamin A both of which are essential for proper growth. If greens are not available, ragi which is rich in calcium can be included. This however will not provide vitamin A. In such a case, the infant must necessarily get vitamin A from some other sources. A teaspoonful of shark-liver oil once a week will ensure that he gets enough vitamin A.

### **MILLET PORRIDGE**

#### **Ingredients**

Roasted bajra*** powder, dehusked	30 g. (2 tablespoons)
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Powdered-roasted, greengram dal or lentil	15 g. (1 tablespoon)
Powdered, roasted groundnut	10 g. (2 teaspoons)
Sugar or jaggery	30 g. (2 tablespoons)
Spinach (or any leafy vegetable)**	30 g.

### Method

- Boil the leafy vegetable in water till soft, mash and strain through a clean cloth.
- Add the millet, Pulse and groundnut powders to the vegetable juice.
- Add jaggery and cook for a few minutes to a semi-solid consistency.

\*\* It is desirable to add green leafy vegetables like spinach (palak) to the infant's diet. Greens provide calcium and vitamin A both of which are essential for proper growth. If greens are not available, ragi which is rich in calcium can be included. This however will not provide vitamin A. In such a case, the infant must necessarily get vitamin A from some other sources. A teaspoonful of shark-liver oil once a week will ensure that he gets enough vitamin A.

\*\*\*Bajra can be replaced by clean, dehusked jowar, ragi or any other millet.

### Adult food modified to suit children's' needs

Many recipes prepared for the entire family can be slightly modified to suit the nutritional needs of children. One such example is Rice kitchen.

### RICE KITCHERI

#### Ingredients

Cooked rice	1 cup (equivalent to 40 g. uncooked rice)
Cooked pulse	1/2 cup (equivalent to 20 g. uncooked pulse)

(Ragam or greengram)

Cooked leafy vegetable                    3 teaspoons (15 g.)

Oil    1 teaspoon (5 g.)

Seasoning material                        as required

### **Method**

- Mix cooked rice and cooked pulse.
- Mash the cooked leafy vegetable with additional water, strain through clean cloth and add the juice to the above mixture.
- Add seasoning to the mixture
- Add sugar or jaggery to it and mix well

By the addition of leafy vegetable, the child gets enough vitamins and minerals. Together with some sugar the dish becomes readily acceptable to the child. This recipe would be better suited to children

Who have cut teeth and can masticate, preferably those beyond 1<sup>st</sup> year of life.

### **Protein-rich supplements that may be added to the family diets**

Usually after the sixth month, the child is given foods prepared for the whole family. The diet supplies about 6-7 g. of protein. In order to make up the deficiencies, especially of protein, it may be advisable to add about 3 to 4 teaspoonful's of roasted groundnut powder to the daily diet of the infant.

Addition of a little sugar not only helps the child to relish the dish. But also gives extra calories.

### **Ready to use infant weaning foods**

As explained earlier, the following recipes can be prepared in bulk and kept ready at hand for feeding infants. In addition to these foods, the infant can be given with advantage:

1. Half-a-cup of fruit juice - daily.
2. A teaspoonful of sharkliver oil - once a week.

In the formulation of these foods, it can be seen that bajra or ragi is suggested as the cereal to be used. These millets are cheaper than rice and wheat, at the same time they are almost equally nutritious. Use of bajra or ragi early in childhood will also help the child to develop a taste for various cereals.

### **BAJRA INFANT FOOD**

#### **Ingredients**

Bajra (dehusked, roasted) 45 g. (3 tablespoons)

Roasted greengram dal  
(or any other dal) 20g. (1-1/2 tablespoons)

Roasted groundnut 10 g. (2 teaspoons)

Roasted docorticated gingelly (til)  
seeds 5 g. (1 teaspoon)

Sugar 30 g. (2 tablespoons)

#### **Method**

- Powder all the roasted ingredients individually; mix them in the proportions suggested. and store in air-tight containers.

### **RAGINA**

#### **Ingredients**

Ragi (dehusked, roasted) 45 g.

Roasted Bengalgram dal 10g.

Sugar 30 g.

### **Method**

- The ingredients are powdered, mixed well and stored in airtight containers.

## **SAJINA**

### **Ingredients**

Bajra (roasted) 45 g.

Greengram dal (roasted) 10g.

Sugar 30 g.

### **Method**

- The ingredients are powdered, mixed well and stored in airtight containers

## **GEHUNA**

### **Ingredients**

Bajra (roasted) 45 g.

Greengram dal (roasted) 10g.

Sugar 30 g.

## **Method**

- Roast wheat, green gram dal and groundnuts separately. Grind and mix them up and store in air-tight containers. Instead of green gram, Bengal gram can also be used.

## **Method of feeding**

While inclusion of skim milk powder is desirable, it may so happen that sometimes this is not available. Even in such cases. It is possible to prepare infant foods based on locally available foods as indicated above. If skimmed-milk powder is available, about 10 g. can be included in the above formula replacing the cereal or millet to that extent.

Whenever required, take suitable amounts (say 60-70 g. or 3 table spoon ful) of any of the above recipes (Nos. 5-9) and mix with a small amount of hot water. Add more sugar, if required, before feeding.

## **Recipes suitable for preschool children**

We have already seen why proper nutritional care of preschool children aged 1-5 years is important. Children in this age group require about 20 g. of protein and 800-1500 calories daily.

Surveys carried out in India have indicated that the present diets of pre-school children are deficient in quantity to the extent of about 300 calories. Supplements based on common locally available cereals and pulses can bridge this gap and incidentally supply additional protein also. Recipes providing this shortfall in calories are suggested below and can be usefully adapted in supplementary feeding programmes meant for pre-school children including those in tribal areas and urban slums. One must also ensure that the bulk of the supplements fed to the child is not unduly large. Due care has been taken of this point in the development of these recipes. For instance, in the recipe based on pressed rice (Recipe No. 15). The pressed rice itself is already pre-cooked and the bulk does not increase much in the final preparation; this may not be so when certain other supplements are used.

The quantities indicated are per child per day. For use in large scale feeding Programme, the quantities of ingredients required for feeding 100 children are given later in the Appendix.

### **JOWAR UPMA**

#### **Ingredients**

Broken jowar (jowar rawa) 45 g.

Roasted groundnuts 15 g.

Oil 7 g.

Seasoning material as required

### Method

- Seasoning material is fried in oil.
- Broken jowar is added and fried till slightly brown. Water is added and cooked till soft.
- Broken groundnuts are added and cooked for a few more minutes.

This recipe is in actual use in the Special Nutrition Programme in the tribal areas of Andhra Pradesh.

## MAIZE PUTTU

### Ingredients

Broken maize 35 g.

Redgram dal (powder) 25 g..

Jaggery 25g.

### Method

- Roast broken maize and red gram dal and powder them.
- Dissolve jaggery in water and strain through a sieve or cloth.
- Prepare a batter of the maize and dal powder with the jaggery syrup.
- Steam-cook the batter on a piece of cloth.

## BAJRA KITCHERI

### Ingredients

Bajra 45 g.

Greengram dal 25 g..

Carrot 20 g.

Oil 8 g.

Instead of carrot, sweet potato or tapioca can be used, if available.

### Method

- Grate carrot.
- Boil dal till half done.
- Add to the boiled dal bajra. The grated carrot and mix well.
- Cook till the grains become soft.
- Remove from the fire and season with cumin and oil.

## BARFI (MISHTI CHEERA)

### Ingredients

Pressed rice 25 g.

Roasted groundnuts 20 g..

Jaggery 25 g.

### Method

- Roast the pressed rice and mix with groundnuts.
- Prepare a sticky syrup from jaggery.
- Add the beaten rice and nuts, and mix quickly.
- Spread the above on a greased plate and cut into pieces immediately.

This recipe is extensively used in the Special Nutrition Programme in Andhra Pradesh.

### **WHEAT-GRAM LADOO**

#### **Ingredients**

Whole wheat	30 g.
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Greengram dal	20 g..
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Groundnut	8 g.
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Sugar or jaggery	20 g.
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Wheat can be replaced by jowar, maize or ragi.	
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#### **Method**

- Roast wheat, green gram dal and groundnut and powder them.
- Make jaggery syrup and add the flour mixture to it.
- Mix well and make into balls.

### **PRESSED RICE LADOO**

#### **Ingredients**

Pressed rice	35 g.
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Roasted Bengalgram dal	25 g..
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Sugar or jaggery	25 g.
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### Method

- Powder pressed rice, roasted Bengalgram dal and sugar and mix the powder.
- Add hot water to make the mixture soft in consistency and make into ladoos.
- Serve ladoos.

This can also be prepared in the form of porridge for feeding infants.

### JOWAR KITCHERI

#### Ingredients

Jowar rawa	35 g.
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Greengram dal	35 g..
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Pumpkin	20 g.
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Carrot	20 g.
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Oil	5 g.
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Seasoning	as required
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### Method

- Boil jowar till half done.
- Add dal and cook for a few minutes.
- Grate carrot and pumpkin and add to the mixture. Cook till semi-solid.
- Remove from fire and add seasoning.

### WHEAT PAYASAM

## **Ingredients**

Whole wheat 30 g.

Roasted Bengalgram flour 20 g..

Sugar 25 g.

Groundnut 8 g.

## **Method**

- Roast whole wheat and powder.
- Add roasted Bengal gram flour, sugar and crushed roasted groundnuts.
- Cook for five minutes.

In addition to these recipes, the snacks suggested in the following section can also be given to pre-school children as frequently as possible.

Many of these recipes have been actually tried out in villages near Hyderabad and also among tribal children in Andhra Pradesh. The women folk and youth club members of the village took active interest in the Programme, and fed the children these recipes. It was found on evaluation that nutritional deficiency signs were less frequently seen in those children who received the supplements than in those who did not receive these recipes. This showed that a motivated community could help improve the nutrition of their children using low-priced locally available foods.

## **Nutritious snacks for infants and preschool children**

It is common practice in many of our homes to give preparations made out of cereals and Bengalgram or sweet-balls made from pulses, oilseeds etc., or other snacks to children. Sometimes, the only snack that is given may be the cheap biscuits from the local village shops.

In fact, a recent survey in a village near Hyderabad showed that the snacks like biscuits were given to children even from the fourth month onwards. It would appear, therefore, that these snacks offer another approach for promoting the

consumption of nutritious foods by children.

The main constituents in most of these cheap biscuits appeared to be bran and millets. Balls prepared from sesame seeds and jaggery or from roasted Bengalgram and jaggery contained negligible amount of pulses or oilseeds. Most of these snacks were of low nutritive quality, being particularly low in protein. If sufficient amount of pulses or oilseeds like groundnut and tii are used, snacks like "Chiki" and till ladoos can also serve as good supplements.

Since snacks like biscuits are acceptable to children, the National Institute of Nutrition has developed some formulae for the preparation of nutritious biscuits from locally available foods. For the same cost, the biscuits based on these formulae provide three to four times more protein than those sold in the village shops. At the same time, the method of preparation is simple. The village co-operatives, women's clubs or even the village shop-keepers can prepare these biscuits with marginal profit. This way, nutritious snacks can be provided to children in the community without much additional expense.

A few recipes for **preparation of nutritious biscuits** are given.

It is common practice in many of our homes to give preparations made out of cereals and Bengalgram or sweet-balls made from pulses, oilseeds etc., or other snacks to children. Sometimes, the only snack that is given may be the cheap biscuits from the local village shops.

In fact, a recent survey in a village near Hyderabad showed that the snacks like biscuits were given to children even from the fourth month onwards. It would appear, therefore, that these snacks offer another approach for promoting the consumption of nutritious foods by children.

### **General method of preparation of the biscuits**

Powder the main ingredients and mix them.

1. Add baking powder and salt and mix thoroughly.
2. Make stiff dough by kneading mixture with fat (except for recipe groundnut biscuits-in which there is no need for additional fat).
3. Roll like chapatis.
4. Cut out any shape desired with tin-lids or any sharp instrument.
5. Place the biscuits on metal trays and bakec them well on heated sand in a dekchi. (The dekchi should be kept with a lif and pieces of live charcoal kept on the lid to ensure uniform all-round heating).
6. Remove the biscuits when they are golden-brown; this usually takes about 20 minutes.

The quantities indicated are for use as supplement per child per day. For feeding larger groups of children, proportionately higher amounts can be used.

### **GROUNDNUT BISCUITS**

#### **Ingredients**

Groundnut(roasted)	25 g.
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Wheat flour (roasted)	25 g..
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Sugar	20 g.
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Baking powder	a pinch
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Salt	a pinch
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### **BENGALGRAM – SEASAME BISCUITS**

#### **Ingredients**

Bengalgram flour	10 g.
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Maida	15 g..
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Sesame	15 g.
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Sugar	20 g.
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Vanaspati	8 g.
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Salt a pinch

Baking powder a pinch

## BENGALGRAM BISCUITS

### Ingredients

Bengalgram flour 25 g.

Wheat flour 25 g..

Sugar 20 g.

Vanaspati 5 g.

Salt a pinch

Baking powder a pinch

## COWGRAM BISCUITS

### Ingredients

Cowgram flour (dehusked) 25 g.

Maida flour 25 g..

Sugar 20 g.

Vanaspati 5 g.

Salt a pinch

Baking powder a pinch

## HORSEGRAM BISCUITS

### Ingredients

Horsegram flour (dehusked) 25 g.

Maida flour 25 g..

Sugar 20 g.

Vanaspati 5 g.

Salt a pinch

Baking powder a pinch

**Source:** [National Institute of Nutrition, Hyderabad](#)

### Related resources

- [Nutrition and Health](#)

**Source:** <https://data.vikaspedia.in/short/lc?k=HiDAfeNTegT8GVILt9PLhQ>



Vikaspedia.in