

Dietary Management of Celiac Disease in Indian Children

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INTRODUCTION

Diet plays an important role in the treatment of celiac disease which includes “exclusion of wheat and wheat products from the diet for life”. In North India, chapati (wheat) is a major food item consumed by most individuals on a daily basis. For this reason, compliance is a major issue. Timely dietary intervention considerably influences the achievement of appropriate growth. The aim of diet therapy includes:

- (1) Establishing an effective gluten free diet.
- (2) Ensuring adequate nutrient intake.
- (3) Ensuring good dietary compliance.

ESTABLISH AN EFFECTIVE GLUTEN FREE DIET

A strict gluten free diet includes exclusion of wheat and wheat products, rye, barley and oats.

FOODS	AVOID	ALLOWED
CEREALS, FLOURS AND PULSES	Whole wheat, Wheat flour (atta), Refined wheat flour (maida), Commercial wheat starch. Barley, rye, oats. Semolina (suji), Sevian (Vermicilli) Chapatis, parathas, puris, Kulchas, Naan, Bhaturas. Upma.	Rice, rice flakes (chirwa), puffed rice (murmura), arrowroot, sago, buckwheat, corn or maize, bajra (pearl millet), tapioca (shimla aloo), Singare ka atta (waterchestnut), sorghum (jowar), Ragi, Cassava. All pulses, lentils and soyabean.
CONFECTIONARY, FAST FOODS & BREAKFAST CEREALS	Ordinary bread (white and brown), Biscuits, Buns, mathis. Noodles, Macroni, Wheat flakes, Oatmeal, Porridge (dalia)	Salted and roasted drynuts and peanuts. Caramel custard, rice noodles, Cornflakes. Besan cheelas
SAVOURY SNACKS	Samosas, Mathis, Patty, Bread rolls Bread Pakoras, Cutlets coated with bread crumbs.	Popcorns, roasted corn, roasted chanas.
SWEETS	Maida may be used as thickener or as adulterant in all pure milk methais such as Milk cake, Burfi. Jalebi, Gulab jamun, Atte ke ladoos and Khoa methais.	Rasgullas, fresh paneer sandesh, carrot halwa, arrowroot halwa, petha. Home made milk based methais. Rice kheer, sago kheer, makhana kheer.
MILK PRODUCTS	Milk Shakes, Flavoured milk, Milk Icecream, Chocolates, Lollies and Ice-creams, Puddings, yogurts, Processed cheese, Cheese spread.	Fresh milk, fresh curd, lassi, cottage cheese (paneer), home made fresh milk shakes.

MEAT, FISH & POULTRY	Sausages, Ham, Seekh Kebabas, Fish fingers, hot dogs.	Reshly cooked meat, fish, chicken made at home. Egg in any form, made at home.
MISCELLANEOUS	Toffees, Chocolates, Chewing gums, Eclairs, Custard powder, hot chocolate drinks, Bread crumbs, Mixed spices, Baking powder.	Fresh fruit juices, fresh lime juice, soft drinks, carrot juice, sherbat, squash & home made fresh soups. All freshly cooked vegetables and fresh fruits. Sugar, Honey & jaggery. Spices and condiments, tea, coffee.
COMMERCIAL PRODUCTS	Nutritional supplements such as Maltova, Bournvita, Horlicks, Boost etc. Baby weaning foods such as farex, cerelac etc. Packet and tinned soups. Bottled sauces & ketchups, Chutneys, pickles Canned and tinned fruits and vegetables, Baked beans. Instant food products and curry mixes,	Nutritional supplements like complan, Build – up, Nutren (junior), Baby weaning foods like Nestum, Cerelac (rice & vegetable), , Farex (rice).

FLOURS WHICH CAN BE USED FOR CHAPATIS / PARATHAS/ PURIS FOR MAIN MEAL

We do not have commercial gluten free flours available in our country unlike developed countries. However, natural gluten free flours are available in India and can be used as substitute for wheat flour.

- Soyabean flour + rice flour (1:3)
- Arrowroot + Potato flour
- Maize flour
- Bajra flour (pearl millet)
- Kottu ka atta (buckwheat flour)
- Singare ka atta (water chestnut flour)
- Tapioca Flour (shimla aloo flour)
- Besan
- Rice flour + besan (3:1)
- Cornflour + besan (3:1)
- Ragi and Cassava

NOTE : Flours can be used individually or mixed with each other according to the liking of the child. Ajwain (thymol) and pinch of salt can be added to any flour while making the dough for a palatable meal. If the child likes sweet foods, chapatis/ parathas/ puris can be sweetened by adding sugar (e.g. bajra sweet roti).

OTHER SUGGESTIONS FOR THE MAIN MEAL

- Rice – Vegetable pulao, tomato rice, tamarind rice, coconut rice, plain boiled rice.

- Dosa, Uttapam, Idli, sago khichri.
- Rice papads, sago papads, dahi vadas – main meal accompaniments.

SUGGESTIONS FOR BREAKFAST AND SNACKS

Milk with cornflakes, Poha, Besan cheelas, besan puras, sago – potato vadas, Dal vada, arrowroot- potato cutlets, sago cutlets, corn cutlets, vegetable cutlets, soya kebabs, Bajra mathris (sweet or salted), paneer tikka, rice noodles, roasted salted peanuts and chanas, salted nuts, popcorn. Egg in any form, fried fish pakoras, paneer pakoras, potato pakoras etc, potato chips. Fried rice flakes, salted puffed rice. Fruit chaat, sprouted dal chaat. Gajak.

SUGGESTIONS FOR DESSERTS

Caramel custard, fruit cream, Rice kheer, sago kheer, makhana kheer, carrot halwa, besan halwa, arrowroot halwa, any vegetable can be used to make halwa, phirni, besan laddoo, fruits in sugar syrup, sweet curd.

NOTE: There is no restriction on oil, ghee and butter. Fats are a concentrated source of energy. It is desirable if the child can consume 1 ½ times more calories than his ideal requirement.

ENSURE ADEQUATE NUTRIENT INTAKE

A nutritionally balanced diet should be advised to the patient to ensure optimal growth. A child with full-blown celiac disease presents with stunted growth, weight loss, anemia, diarrhea, abdominal distention, muscle wasting, anorexia, and fail-ure to thrive due to multiple enzymatic and nutritional deficiencies. Elimination of gluten from the diet is the only effective treatment .

The objective is to provide calories upto 1½ to 2 times the RDA as malnutrition is almost universal in these children. Calories are increased gradually from 80-100 kcal/kg/day to 150-200kcal/kg/day predominantly using carbohydrate and fat sources of food. The diet of a celiac child is lacking in complex carbohydrates due to the exclusion of wheat and wheat products. Secondary disaccharidase defi-ciency has been clearly demonstrated to be present in virtually all children with celiac disease at the time of diagnosis and temporary avoidance of lactose or a low lactose diet at the start of nutritional management may hasten recovery.

Proteins are increased upto 1½ to 2 times the RDA i.e. as much as 15% of the total calories, in order to promote growth, replenish protein stores, prevent hypo-proteinemia and stunting, overcome enzyme deficiency and prevent failure to thrive.

Fats are a concentrated source of energy and provide satiety and palatability to food. Fats may be increased gradually from 25% to as much as 50% of the total calories. Improvement of bowel absorptive function leads to improved fat absorption.

Multiple vitamin and mineral deficiencies occur in untreated celiac disease and have to be replenished. Fat soluble vitamins like A, D and E should be provided in adequate amounts. In severe cases, water soluble vitamins are also inadequately absorbed. Vitamin C (to enhance the absorption of iron) and Vitamin B-complex should be administered.

Supplements of Calcium and Magnesium are required to prevent hypocalce-mia, hypomagnesemia, tetany and rickets. Vitamin B 12 and folic acid should be supplemented.

Hyponatremia and hypokalemia may be precipitated by excessive stool losses and should be avoided by adequate supplementation. Growth appropriate for age is usually achieved during the second year of treatment but there may be considerable variation among children with regard to catch-up growth.

ENSURE GOOD COMPLIANCE

Good compliance is very important to prevent complications. To ensure good compliance, regular follow up and periodic monitoring of height and weight is essential. Ensuring proper dietary compliance in Indian children with celiac disease can be challenging, especially in parts of the country where wheat is consumed regularly. Improvement in appetite, decreased malabsorption, increase in height and weight and an improved sense of well being are indicators of good dietary compliance.

However, if the child fails to improve within a few weeks, the dietary intake should be meticulously reviewed and reasons for non-compliance should be evaluated. Inaccurate comprehension, inability to select foods free of gluten, social stigma and poor rapport with parents and family may be the reasons for poor compliance. It is extremely difficult to convince the parents about the gravity of the problem. Therefore, initially, regular follow-up is often poor. Spending time with parents, developing rapport with them and the child and to plan the diet according to the likes and dislikes of the child is very important to ensure good compliance. In most Indian families, food is cooked for the whole family and mothers find it difficult to cook separately for the celiac child. There is also a lack of variety of gluten free foods.

The possibility of accidental ingestion of gluten should be minimized and this is possible largely by strict supervision. Gluten-free flour is not yet a feasible option in India as it is not available and needs to be imported. Owing to increased awareness and improved diagnostic techniques, celiac disease is being recognized in India as an entity.

SAMPLE DIET CHARTS

1200 Kcal gluten free diet chart

MENU PLAN

Early Morning	Sweet Milk with cornflakes 150ml
Breakfast	sago – potato cutlet
Midmorning	Banana with curd – 50 ml
Lunch	Chapati-1 stuffed with green leafy vegetable, Dal – ½ katori
Teatime	Milk – 150 ml with chirwa (kheer)
Dinner	Rice – 1 katori, ½ katori dal
Bedtime	Milk – 150 ml

1400 Kcal gluten free diet chart

* Chapati made out of any flour other than wheat (gluten) – see list of flours which can be used.

MENU PLAN

Early Morning	Sweet Milk with cornflakes 200ml
Breakfast	Besan cheela stuffed with green leafy vegetables
Midmorning	Banana and salted peanuts
Lunch	Chapati-1 with Dal – 1 katori
Teatime	Milk – 150 ml with chirwa (kheer)

Dinner Vegetable pulao – 1 katori with sweet curd – 150 ml sago-potato cutlet -1

SOME IMPORTANT TIPS

- Charts can be designed according to the nutritional requirements, age, preferences of each child.
- To ensure nutritionally balanced diet, it is important to eat wide variety of different foods.
- Variety can be incorporated in the diet by making use of suggestions for various meals as mentioned above.
- Nothing is too much for the child i.e. there is no harm if a 2 year old is consuming 1600 Kcal (whereas his ideal requirement is 1200 Kcal). Consuming extra calories will only help him to catch-up his growth fast.
- If the child is not gaining adequate height inspite of good compliance with GFD, increase proteins to 15%. Make use of egg, meat, fish, chicken, paneer but if it is not affordable, cheaper substitutes of protein such as soyabean, peanut, roasted chanas, sprouts can be advised.
- Fats can be increased to as much as 40% of the total calories if the child is not gaining adequate weight. In contrast, if the child is gaining excessive weight, fat should be kept to moderate amounts (20%).
- Increase total calories in terms of all three macronutrients if the child is not doing well overall inspite of keeping to strict GFD. Merely prescribing increase in food may not be successful unless diet is planned according to the child's preferences and choices.
- Plenty of different fruits and vegetables are allowed as these are an important source of fiber, vitamins and minerals.

SUBSTITUTIONS TO ADD VARIETY TO THE DIET

1 glass milk (250 ml) equivalent to

- 2 katoris curd
- 50g cottage cheese
- 750 ml buttermilk
- 2 tbsp (35 g) Khoa
- 40 – 50 g chicken/ fish/meat
- 1 ½ egg (1 egg = 200ml milk)
- 3 tbsp (45 g) skimmed milk powder
- 1 ¾ katori dal (cooked) or 45 g raw dal
- 25 g of groundnuts

NOTE: 1200 Kcal and 1400 Kcal gluten free diet charts are the sample diet charts. The meal timings, food items and menu can be changed according to the convenience and choice of the child as long as the total calories and percentages of macronutrients remain unchanged. Percentage of Carbohydrates, proteins and fats can also be changed in case the child needs any of the nutrient in additional or less amount in the diet which is decided during the follow-up assessment.

GLUTEN FREE MENU FOR SCHOOL GOING CHILD (1600 – 2000 KCAL DIET)

Breakfast	Milk with chirwa or cornflakes/plain milk Poha/ sago khichri/ besan cheela/ uttapam
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	(see suggestions for breakfast)
Packed Lunch	Plain chapati with ghee/ paratha/ puri made out of GF flours (see suggestions for flours). With vegetable/ chutney/ home made pickle. OR Stuffed with green leafy vegetables/ dal/ any other OR vegetable Pulao / pea pulao/ soya nuggets in rice with chutney. OR Dosa/ Uttapam/ Idli with coconut chutney AND fruit
Lunch	Rice – dal – curd – vegetable – salad OR GF Chapati – dal – curd – vegetable – salad OR Dosa/ Uttapam/ Idli – sambhar – coconut chutney. OR see suggestions
Tea	Milkshake/ Plain Milk/ Lassi Aloo finger chips/ sado vadas/ vegetable cutlets/ Aloo tikki/ Salted peanuts/ roasted chanas/ sprouted dal chaat OR see suggestions for snacks
Dinner	Matar paneer / Egg curry/ Meat/ fish/ chicken (optional) OR plain dal/ soyabean. GF chapati/ paratha/ Puri/ Besan cheela/ Pulao/ Plain rice Curd/ Raita or milk at bedtime. Vegetable salad