



NUTRISearch

An Official e-Journal of Pediatric & Adolescent Nutrition Society
(IAP Subspecialty Chapter on Nutrition)



Issue 2

Volume: 1 June, 2019

Editorial Board

Chief Advisors

Digant Shastri

Bakul Parekh

Piyush Gupta

Editor-in-Chief

Praveen Kumar

Associate Editors

Bhavna Dhingra Bhan

Preeti Singh

National Advisors

A P Dubey

K E Elizabeth

Rekha Harish

N Mohanty

Ajay Gaur

Message from the Chairperson



I have great pleasure in writing this message for the second issue of the Nutrisearch for 2019. The response to the first issue was phenomenal and I congratulate the Editorial team for maintaining the periodicity and quality of the academic mouthpiece of our society. I am also delighted to share with you all that the Nutrition Chapter of the Indian Academy of Pediatrics is now a registered society "Pediatric and Adolescent Nutrition Society." I specially thank Dr Praveen Kumar, the dynamic secretary who made it possible through his untiring efforts and persurance. The process has now entitled us of a symposium slot at the National conferences. We now can also operate account with a separate PAN number.

Over last two decades there has been an increasing trend of consumption of fast foods and sugar sweetened beverages (fruit juices and drinks, carbonated drinks, energy drinks) in Indian children. Easy availability, convenience, palatability, working parents, attractive presentation, catchy advertisements, low cost and vigorous marketing strategies are considered the major factors for high consumption of these products. A survey conducted by Centre for Science and Environment (CSE), documented that 93% of the children eat packaged food and 68% consume packaged sugar-sweetened beverages more than once a week; 53% consume these products at least once a day. Almost one-fourth of the schoolchildren consume ultraprocessed food high in fat, salt or sugar (HFSS) such as burger and pizza, from fast food outlets, more than once a week. The adverse effects related to intake of fruit juice and fast foods are well known. We had a National Consultative Meet on Fast foods, Fruit Juices and Energy drinks on 11 March 2019 attended by our members and representatives from the Indian Academy of Pediatrics, National Institute of Nutrition, Indian Council of Medical Research, Ministry of Women and Child Development, and Unicef. I am happy to inform with you that after much discussions and deliberations, the draft guidelines and recommendations are now ready for publication and dissemination through the mouthpiece journal of Indian Academy of Pediatrics. Hopefully we should see them in print before the end of this year.

As per National Family Health Survey 2015-16, the number of people with obesity has doubled over last 10 years in India; with an increasing trend of being overweight in children and adolescents. This issue of the Nutrisearch has an important article on childhood obesity. Another review is devoted to nutritional care of children with diabetes. Your comments and suggestions are welcome on these and other articles in this issue.

It is my earnest appeal to all the IAP members who are interested in this field to become members of the society and contribute to its activities and the Journal.

Piyush Gupta

MD, FIAP, FNNE, FAMS

Chairperson, Nutrition Chapter: IAP

and Professor of Pediatrics,

University College of Medical Sciences, Delhi

Message from The Editor-In-Chief



Dear Friends,

Greetings from the Editorial Team NUTRISearch!

It gives us immense pleasure in bringing second issue of “NUTRISearch” official e-Journal of Pediatric and Adolescent Nutrition Society for you. We are thankful to you for your encouraging feedback and suggestions.

We all are aware that India is facing dual burden of malnutrition i.e. both under nutrition and obesity. Obesity and other metabolic diseases are emerging as a big threat for our future. With the aim to increase awareness about this problem, we have included a review article on “Obesity in Children” by Dr. Preeti Singh. In addition, we also have a review article on “Dietary Management of Type 1 Diabetes Mellitus” by Ms. Garima Sharma who is involved in nutritional care of these patients at Kalawati Saran Children Hospital for many years. I hope you will find both these review articles useful. Please send us your feedback, comments and suggestions. We also invite articles from our members for future issues of NUTRISearch.

We are happy to inform you that we are now registered society under Government of NCT of Delhi and will be working closely with Central IAP to improve nutritional services to our children. We request you to encourage your colleagues and students to join this society. (Membership form attached)

We are also happy to announce that Pediatrics and Adolescent Nutrition Society is organizing a national conference on micronutrients “MICRONUTRICON 2019” on 8th Sept 2019 at IHC, New Delhi to increase awareness regarding the importance of micronutrients for growth, immunity, health and happiness and consequences of micronutrient deficiency among pregnant women and young children. We cordially invite our members and their colleagues to register for MICRONUTRICON 2019. (Registration form attached)

Praveen Kumar

MD

Secretary, Pediatric & Adolescent Nutrition Society IAP

and Director Professor of Pediatrics,

Lady Hardinge Medical College & Assoc Kalawati Saran Children’s Hospital

New Delhi

Obesity in Children

Preeti Singh

From Department of Pediatrics, Lady Hardinge Medical College and Kalawati Saran Children's Hospital, New Delhi, India

Introduction

There has been a worldwide increase in prevalence of overweight and obesity among people of all ages in both developed and developing countries. Overweight children often become overweight/obese adolescents and adults. Obesity is associated with the development of varied medical complications and increased morbidity and mortality in both children and adults. This necessitates the need to identify overweight and obese children and implement appropriate management and prevention strategies from point of inception.

Definition of Pediatric Obesity

Obesity is defined as an excessive storage of energy as fat, manifesting as excess body weight in relation to lean body mass. Weight alone is not a good index of fatness as it does not take into consideration an individual's height. The most acceptable definition for overweight/obesity is given by World Health Organization (WHO) and International Obesity Task Force (IOTF) is in terms of **Body Mass Index** [BMI is defined as weight in (Kg)/height (m²)]. It not only reflects the adiposity, but has been shown to correlate with the risk of various medical complications. In children and adolescents, overweight and obesity are usually defined using age and gender specific norms of BMI. For children under 5 years of age, overweight and obesity are defined as weight-for-height/length (WFH/L) > +2 SD and > +3SD above WHO Child Growth Standards median respectively. Beyond 5 years, BMI greater than + 2SD (> 95th centile) for age and sex above the WHO Growth Reference median are classified as obese, while those between + 1SD and + 2SD (between 85th and 95th percentile) as overweight. The new revised IAP 2015 references have recommended the use of 23rd and 27th adult equivalent cutoffs lines to define overweight and obesity respectively. The BMI of 23 (overweight) corresponds to 71st centile for boys and 75th centile for girls while BMI of 27 (obesity) matches with 90th and 95th centile for boys and girls respectively.

Correspondence to: Dr. Preeti Singh, Assistant Professor, Division of Pediatric Endocrinology, Department of Pediatrics, Lady Hardinge Medical College and Kalawati Saran Children's Hospital, New Delhi, India.

This recommendation was proposed because the Asian population is known to have more adiposity and increased cardiometabolic risk at a lower BMI. The disadvantage of using BMI is that it does not distinguish reliably between lean and fat mass, and does not predict percentage body fat consistently across ethnicities. The Asian Indians have higher body fat compared with Caucasians for similar BMI. Accurate measurement of body fat is possible through complicated expensive techniques like dual energy X-ray absorptiometry (DXA), bioelectrical impedance assay (BIA), air displacement plethysmography and stable isotope dilution techniques. They are useful in research mode and special individual situations and not for routine practice. Body mass index (BMI) shows a good correlation with body fat percentage, and is widely used in clinical practice to screen overweight and obese children. Skin fold thickness and waist circumference/waist hip ratio are also being used for measuring body fat in children and adolescents.

Waist circumference

It is a measure of central/truncal obesity and hence has been seen to correlate more strongly than BMI with several complications such as insulin resistance, dyslipidemia and non-alcoholic fatty liver disease. The adult cut-offs of waist circumference (90 and 80 cm respectively for Asian males and females) can be considered as indicative of abdominal obesity for adolescents. Recently, Khadilkar et al have suggested use of 70th centile as the cut-off of waist circumference for screening metabolic syndrome. Waist to hip circumference ratio (WHR) [>0.95 and 0.85 for adolescent boys and girls, respectively] is a measure of truncal obesity. Waist circumference to height ratio of >0.5 is also a convenient and age independent method to identify children and adolescents at increased risk for metabolic complications.

Skin fold thickness

Measurement of skin fold thickness (SFT) gives the estimate of the body fat. Peripheral fat is measured by triceps and biceps SFT and central fat by sub scapular and supra iliac SFT. SFT can help differentiate obesity due to increased muscle mass and frame size from obesity due to excess

subcutaneous fat. The values can be compared with the reference data or can be used in standardized equations to calculate total fat mass or the percentage of body fat. It has limited use in clinical practice, more of research tool.

Etiology of Obesity

Simple Obesity is the most common form of obesity (95% of cases) seen in pediatric population (**table 1**). Its primary cause is nutritional due to imbalance of energy intake with expenditure. Dietary factors (increased intake of processed and refined diet, sweetened beverages) and poor life style (increased time spent on TV viewing, internet browsing or playing electronic games, reduced physical activity, reduced sleep) are implicated in simple obesity. Epigenetic programming in small for gestational age (SGA), large for gestational age (LGA) infants and those with rapid catch-up growth in first few years of life compound the problem especially in an obesogenic environment. Previous growth records should be evaluated for determining the age of onset of obesity and linear growth. A child with simple obesity has insidious onset weight gain, is relatively tall for age/genetic potential, though the BMI/age is disproportionately higher. There is usually an underlying family history of obesity. Such children have dietary & life-style patterns compatible with obesity and have a normal development.

It is important to distinguish between simple obesity and the less common pathological obesity due to genetic/syndromic disorders, endocrine disease, central nervous system lesions, or iatrogenic causes. Always take a history of exogenous

Table 1 Etiology of childhood obesity

Simple obesity
Pathological Obesity
<ul style="list-style-type: none"> ▪ Endocrine <ul style="list-style-type: none"> ➤ Hypothyroidism ➤ Cushing syndrome (including intake of steroids) ➤ Growth hormone deficiency ➤ Pseudohypoparathyroidism ➤ Acquired hypothalamic lesions e.g. tumor (craniopharyngioma), trauma, post infectious. ➤ ROHHADNET: Rapid onset obesity, hypothalamic dysfunction, hypoventilation, and autonomic dysregulation, with neural crest tumors ▪ Genetic: Monogenic (Mutations in MC4R, POMC, leptin or leptin receptor genes) ▪ Syndromic: Prader Willi Syndrome, Bardet Biedel, Beckwith- Wiedemann, Carpenter, Cohen, Albright Hereditary Osteodystrophy etc.
Others: Immobilization, drugs (steroids, anti-epileptics (valparin, carbamazepine), estrogen, tricyclic, antidepressants, risperidone), muscular dystrophy.

steroid intake (Exogenous Cushing's syndrome) in an obese child. Unlike simple, children with pathological obesity are usually short and may have a low growth velocity as well. Children with congenital hypothyroidism and GH growth hormone deficiency have normal or high weight for height (because of poor linear growth) and a delayed bone age. The red flags for pathological obesity are enumerated in **table 2**. Most of the genetic syndromes associated with obesity are characterized by short stature, dysmorphic features, developmental delay and hypogonadism. Coexistence of such features should prompt a work up for syndromic obesity.

Table 2 Red Flags for pathological obesity

- Early onset obesity - very rapid gain in weight in first few years
- Hyperphagia—non-discriminatory
- Short stature for age or MPH/poor linear growth.
- Dysmorphic and associated features like developmental delay, vision abnormalities and behavioural problems.
- Hypogonadism

Assessment of a Child with Obesity

A child with obesity needs a comprehensive medical and nutritional assessment. History is assessed towards underlying etiology (simple or pathological), modifiable dietary and lifestyle factors, current and future risk of obesity related complications (**table 3**). Age of onset of obesity and rapidity of weight gain should be ascertained.

Examination

Physical examination should first be directed towards recording and graphical plotting of height, weight, BMI. Waist circumference and skin fold thickness can be measured to evaluate the body fat distribution. The presence or absence of any distinctive or dysmorphic features guide towards the genetic/syndromic causes of obesity. Children with simple obesity have accelerated linear growth whereas those with pathological causes are usually short or have their growth curve falling off their previous centile on the growth chart. The pre and peripubertal obese boys are often brought to medical attention for a disproportionately small penis. However, once the pubic fat is pushed and the stretched penile length measured from pubic symphysis to the tip of the glans, the length comes out to be normal for age. Excess production of estrogen (increased aromatisation of the adrenal androgens to estrogens in the excess fat cells) leads to gynaecomastia in males. Some obese adolescent children may experience early puberty, compromising their final adult height. Acanthosis nigricans, hyper pigmented and hypertrophic skin in the nape of neck and axilla, is

Table 3: Evaluation of an obese child on history

History	Possible associations
Polydipsia, polyuria, nocturia, nocturnal enuresis	Diabetes mellitus
Constipation, cold intolerance, fatigue	Hypothyroidism
Shortness of breath, exercise intolerance	Asthma
Acne, hirsutism and menstrual irregularity	Polycystic ovarian syndrome
Snoring, sleep disruption, morning headaches, day time somnolence	Obstructive sleep apnea
Hip, knee or back pain	Slipped capital femoral epiphyses
Abdominal pain	Gastroesophageal reflux, constipation, gall bladder disease, nonalcoholic steato hepatitis
Irregular menses/ increased hair growth	Polycystic ovarian disease (PCOS)
Birth history	Birth weight, maternal gestational diabetes, breast-feeding.
Family History	Obesity, type 2 diabetes, hypertension, lipid levels, heart disease.
Development History	Developmental delay (genetic syndromes)
Dietary history and physical activity	Assessment of calorie intake, food seeking behavior, excessive consumption of sweetened beverages, energy dense food, large food portion size, low consumption of fruits and vegetables, meal frequency and quality, snacking patterns, exercise, television/mobile viewing, number of hours of sleep per day
Psychological assessment	Eating disorder, depression, self-esteem, readiness for behavior change

the hallmark of insulin resistance commonly observed in overweight and obese children. **Table 4** summarizes the key features to be looked for in an obese child.

Table 4: Clinical Examination of an obese child

Parameters	Details
Anthropometry	Weight, height, BMI, mid-parental height and compare with age and gender specific population norms
Body fat distribution	Skin fold thickness (SFT), waist circumference
Blood pressure	Compare with age/height appropriate standards
Skin examination	Acanthosis nigricans Acne, hirsutism (PCOS) Violaceous stria (Cushing Syndrome)
Moon facies, buffalo hump	Cushing Syndrome
Micropenis (hypogonadism), undescended testis	Prader-Willi Syndrome
Dysmorphic features Round facies, small hands and feet Polydactyly	Albright's Hereditary Osteodystrophy Bardet-Biedl syndrome
Bowing of legs, limp, limited range of motion at joints	Orthopaedic evaluation
Hepatomegaly	Nonalcoholic steato hepatitis (NASH)

Common co-morbidities associated with obesity

Common comorbid conditions associated with obesity are insulin resistance, type 2 diabetes mellitus, dyslipidaemia, hypertension, non-alcoholic steatohepatitis, depression, poor self-esteem, orthopaedic conditions (Perthes disease, Blount's disease), sleep apnea and polycystic ovarian syndrome. To date, there is no clear consensus on whether metabolic syndrome should be defined in pediatric populations and, if defined, which definition to use. American Academy of Pediatrics (AAP) recommends to focus on screening and treating the individual cardio-metabolic risk factor components (hyperglycemia, increased central adiposity, elevated triglycerides, decreased high-density lipoprotein cholesterol, and elevated blood pressure) of metabolic syndrome.

Investigations

A large proportion of children and adolescents have simple obesity, they should not be unnecessarily investigated for endocrine or genetic causes. Specific investigations should be done only if red flag signs are present. The following workup is planned to look for complications:

1. Fasting and post prandial blood sugar, lipid profile
2. Consider modified oral glucose tolerance test if high risk

3. Liver function tests, ultrasound (USG) for fatty liver
4. Investigations for Polycystic ovarian syndrome if hirsutism or oligomenorrhea in pubertal girls
5. Sleep study if indicated

Management

Management of a child with obesity requires combined effort of the entire family. Intensive, age-appropriate, culturally sensitive, family-centered lifestyle modifications (dietary, physical activity, behavioral) are the key to management of an obese child.

Dietary Management: Aim at weight maintenance (overweight & obese children < 6 years & over-weight older children & adolescents) or weight loss (obese children > 6 years age & associated co-morbidities) without compromising appropriate calorie intake and normal nutrition. The goal is to achieve a healthy weight during a phase of rapid growth that involves gain of both fat and lean mass. It is essential to recognize eating cues in the child's or adolescent's environment, such as boredom, stress, loneliness, or screen time. Ensure timely, regular meals, and avoid constant "grazing" during the day, especially after school and after supper. Discourage skipping or inadequate meals which often lead to out of control eating later in the day. The ultimate aim is to promote weight loss or stabilize the rate of weight gain, reduce visceral fat, correct dyslipidemia and normalize blood pressure. The dietary management focusses on intake of food which is rich in fibre and low in saturated fat, cholesterol and plain sugar content. Avoid foods with high glycemic index. Plan for healthy snacks, and ensure adequate intake of fruits and vegetables. It is suggested that meals outside of the home be limited and family meals be encouraged, in order to allow the child to reach self-regulation, moderating the use of restrictive behaviours. Refer to a registered dietician for family medical nutrition therapy in which 25-30% of calories are from fat, ≤ 7% from saturated fat, ~10% from monounsaturated fat, < 200 mg/day of cholesterol and avoid trans-fat as much as possible.

Exercise: Exercise is an important adjunct to diet therapy in the management of overweight and obesity. Jogging, cycling, tennis, cricket, volleyball, basketball and badminton are some of the activities that the children enjoy and hence more likely to participate. Try to aim for structured physical activity to at least 60 minutes per day, and reduce daily TV, video-game or computer time to one hour or less.

Behaviour modification and Social Support: It is the backbone of effective weight loss program. Convince entire family regarding need for weight loss & ensure their participation. Encourage other obese family members to

lose weight. Provide parental model of healthy diet, physical activity and minimal TV viewing. Try to inculcate setting goals and self-monitoring of weight & calorie intake. Building self-confidence and self-esteem and improving attitude towards food, exercise and body image can go a long way in achieving the therapeutic goal.

Pharmacologic Treatment

There are limited studies on the efficacy and safety of pharmacotherapy in the management of children with obesity. Sibutramine can be given in those >16-years of age while orlistat is approved for use in the age group 12–16 years. The drugs do not alter the physiology or the behaviour in obese children, effect is short lived and may have potentially serious side-effects. Hence their use is strongly discouraged in children. It is important to remember that drugs have no role in obesity management without concomitant use of dietary regulations, exercise and life-style modification.

HMG CoA reductase inhibitors may be used in children more than 10 years of age with persistently elevated LDL-C (>130 mg/dl) despite adequate dietary interventions to bring down the levels of LDL-Cholesterol and Triglycerides if they are persistently elevated. Metformin (approved for > 10 y old) is useful in adolescents with insulin resistance/impaired glucose tolerance, PCOS. Hypertension is treated using (ACE) inhibitors or angiotensin receptor blocker (ARB) if there is angiotensin converting enzyme no response to lifestyle and behaviour interventions.

Bariatric Surgery is indicated in older adolescents with a BMI of >40 kg/m² or has a BMI of >35 kg/m² and significant comorbidities, who have attained Tanner 4 or 5 pubertal development and final or near-final adult height.

Prevention of Obesity

Parental education and knowledge regarding correct diet principles is the key to prevention of obesity. Provide anticipatory guidance from early childhood and focus specially on pre-school age group & adolescents. This would inculcate healthy dietary and lifestyle practices in the child at the outset. Avoid force feeding, fast foods and soft drinks. Keep fat intake moderate & limit intake of sweets and other nutrient poor foods. Express affection & approval through ways other than food. Encourage physical sports & outdoor games (at least 1 hr.) and restrict TV screen time. Regular monitoring of height, weight, BMI so as to identify the high risk children. Emphasize parent's role as models of healthy behavior.

Suggested Reading

1. Styne DM, Arslanian SA, Connor EL, Farooqi IS, Murad MH, Silverstein JH, Yanovski JA. Pediatric Obesity- Assessment, Treatment, and Prevention: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab.* 2017 Mar 1;102(3):709-757.
2. Steinberger J, Daniels SR, Eckel RH, Hayman L, Lustig RH, McCrindle B, Mietus-Snyder ML; American Heart Association Atherosclerosis, Hypertension, and Obesity in the Young Committee of the Council on Cardiovascular Disease in the Young; Council on Cardiovascular Nursing; and Council on Nutrition, Physical Activity, and Metabolism. Progress and challenges in metabolic syndrome in children and adolescents: a scientific statement from the American Heart Association. *Circulation.* 2009 Feb 3;119(4):628-47.
3. Khadilkar A, Ekbote V, Chiplonkar S, et al. Waist circumference percentiles in 2-18 year old Indian children. *J Pediatr.* 2014; 164:1358-62.
4. Aggarwal B, Jain V. Obesity in Children: Definition, Etiology and Approach. *Indian J Pediatr.* 2018 Jun; 85(6):463-471.
5. Vikram NK. Cardiovascular and Metabolic Complications - Diagnosis and Management in Obese Children. *Indian J Pediatr.* 2018 Jul; 85(7):535-545.
6. Dabas A, Seth A. Prevention and Management of Childhood Obesity. *Indian J Pediatr.* 2018 Jul; 85(7):546-553.
7. Magge SN, Goodman E, Armstrong SC. The Metabolic Syndrome in Children and Adolescents: Shifting the Focus to Cardiometabolic Risk Factor Clustering. *Pediatrics.* 2017 Aug;140(2). pii: e20171603.

Dietary Management of Type 1 Diabetes Mellitus

Garima Sharma

From Pediatric Centre of Excellence and ART Centre, Kalawati Saran Children's Hospital, New Delhi

Introduction

Nutritional management is one of the cornerstones of diabetes care and education. Dietary recommendations for children with diabetes are based on healthy eating recommendations suitable for all children and adults and therefore the whole family. There is no need for a restrictive or special diet. Nutritional advice must be adapted to cultural, ethnic and family traditions, and the psychosocial needs of the individual child.

A dietician with special experience in pediatric diabetes and carbohydrate counting should be an integral part of the multidisciplinary team caring for the patient with T1DM. Regularity in meal times and routine help to establish better eating practices and monitoring of food intake, which have been associated with better glycemic outcomes.

A special diet would be needed only in the following situations:

- Presence of microalbuminuria: protein restriction to the amount recommended for a child of that age group, without diabetes.
- Hypertension: salt restriction.
- Hyperlipidemia: reduced fat intake to 25% of total calories, saturated fat to <7% and increase consumption of monounsaturated fatty acids or MUFA and omega -3 fatty acids
- Celiac disease: gluten free diet

Aims of Nutritional Management

- Encourage lifelong healthy eating habits while preserving social, cultural, and psychological well-being.
- Three meals a day incorporating a wide variety of nutritious foods from all food groups, with healthy mid meal snacks.
- Implementation of individualized meal plan with prandial insulin adjustments.
- Provide sufficient and appropriate energy intake and essential nutrients for optimal growth and development.

- Avoid restrictive diet as it may result in poor growth, nutritional deficiencies and psychological disturbances.
- Encourage regular physical activity to achieve an appropriate BMI and waist circumference.
- Achieve a balance between food intake, metabolic requirements, energy expenditure, and insulin action profiles to attain optimum glycemic control.
- Prevent and treat acute complications of diabetes such as hypoglycemia, hyperglycemic episodes, DKA and exercise-related problems.
- Reduce the risk of micro-vascular and macro-vascular complications.
- Maintain and preserve quality of life.

Energy balance and optimizing growth

The caloric requirement of a child with T1DM is calculated as for any age and sex matched non-diabetic child. The caloric requirement is higher than normal soon after diagnosis and after recovery from DKA to restore the preceding catabolic weight loss. This phase lasts till the pre-illness weight has been regained. Meal planning is of utmost importance to match insulin (type and amount), exercise and child's appetite and eating pattern. Meal time routines and dietary quality are important for optimal glycemic control.

Regular monitoring of weight and height is required to identify the inappropriate weight gain or loss. These parameters must be serially plotted on the age appropriate growth charts and compared with the reference standards (WHO 2007 growth references up to age of 5 years and IAP 2015 reference curves from 5-18 years). Inadequate weight gain or weight loss detected on serial growth plotting, would point to the possibility of insufficient calorie intake. Other causes that need to be considered include poorly controlled diabetes, comorbidities like hyperthyroidism, celiac disease, eating disorder or associated chronic systemic illnesses. Excessive weight gain could be due to overeating with over-insulinization. Other possibilities include hypothyroidism and frequent hypoglycemia with over correction.

Correspondence to: Ms. Garima Sharma, Nutritionist, PCoE and ART Centre, Kalawati Saran Children's Hospital, New Delhi
Email: 82.garima@gmail.com

Food Components

Carbohydrates

Of the total calories in the diet 45% – 55% should be derived from carbohydrates. The carbohydrate intake should be individualized based on the age/sex and activity. Healthy sources of carbohydrates like cereals, legumes, fruits, vegetables and low fat dairy products should be encouraged to improve glycemic control.

Digestible carbohydrates are classified as starches and sugar. Starches are complex carbohydrates that are slowly digested and absorbed and hence do not produce a rapid or sharp rise in blood glucose. They are consumed in natural or in refined forms; the former should be preferred. Sucrose and sucrose containing food should be consumed in the context of a healthy diet (not more than 10% of the energy intake). Inappropriate and large quantities of sugary beverages have been associated with post prandial hyperglycemia and weight gain. Consumption of such foods should be minimized.

The glycemic index (GI) compares post prandial blood glucose response to constant amounts of different carbohydrate counting foods. It measures the rise in blood glucose above fasting in the first 2 hours after ingestion of 50 g of the carbohydrate under study compared with the response to a reference food (glucose or white bread). Low glycemic index (GI) foods produce slower and lower postprandial blood glucose (PPBG) over the first 2-3 hours after ingestion. Substituting foods with low- GI for high-GI carbohydrate is a useful way to reduce post- prandial hyperglycemic excursions.

- Low GI foods include chapattis and bread made from whole wheat, bengal gram and gram flour, oats, barley, soybeans, kidney beans, peas, lentils, cashew nuts, yoghurt, strawberries, apples, peach, pear, plum, apricots, cherries and oranges.
- Foods with high GI include white bread, white rice, puffed rice, jowar, ragi, maize, semolina, tapioca, cornflakes, potatoes, pineapple, papaya, mango, watermelon and honey.

Fiber

Indigestible carbohydrates present in food are designated as “dietary fiber” or “unavailable carbohydrates”. As fiber is not digested, it does not contribute to calories. As a thumb rule, adequate daily fiber intake (grams) in a child beyond 2 years is equal to child’s age plus 5 grams. The traditional Indian diet is naturally high in fiber content.

- Intake of a variety of fiber containing foods such as legumes, fruit, vegetables, and whole grain cereals should be encouraged to decrease post prandial hyperglycemia.

The soluble fiber in these foods is useful to reduce lipid levels.

- Insoluble fiber found in grains and cereals promotes healthy bowel function.
- Fiber should be increased slowly in the diet to prevent abdominal discomfort.
- Any increase in fiber intake should be accompanied by an increase in fluid intake.
- Higher fiber foods may help to improve satiety, replace more energy dense foods and prevent weight gain.

Protein

Protein intake should be 15 - 20% of the caloric requirement. The protein requirement progressively falls from 2 g/ kg during infancy to 1 g/kg at 10 years and 0.8-0.9 g/kg in late adolescence.

- Protein promotes growth only when sufficient total energy is available.
- Sources of animal protein are of better quality as they provide all essential amino acids. These include fish, lean cuts of meat, and low-fat dairy products.
- Sources of vegetable protein such as legumes should also be encouraged as they are accompanied by fiber and complex carbohydrates and contain less of saturated fat.

Fats

Fats should provide 30%-35% of total calories (35% in infants below 2 years of age). All fats provide the same number of calories and contribute equally to weight gain, but some are beneficial to the cardiovascular system while others can be harmful. Hence attention needs to be paid to both the amount and quality of fat in diet.

- Saturated fat consumption should not exceed 10% of the total calories. Higher intakes are associated with increased risk of cardiovascular disease. Saturated fats are the main components of LDL cholesterol. They raise serum total cholesterol (LDL and HDL). They are chiefly derived from animal sources including dairy products. They are found in egg yolk, flesh foods, poultry skin and in those fats that are solid at room temperature (coconut oil, butter, ghee etc.). Non vegetarian foods with low saturated fat content are fish, lean meat, poultry without skin and fat. In patients with raised LDL cholesterol, the saturated fat intake needs to be reduced to below 7% of total calories.
- Unsaturated fats are classified as polyunsaturated and monounsaturated fatty acids. They are mainly derived from plant and vegetable sources. These fats have beneficial effects on LDL cholesterol and in case of

monounsaturated fatty acids also on HDL cholesterol. They help to reduce the risk of cardiovascular disease.

Polyunsaturated fatty acids (PUFA) are essential fatty acids as they are not synthesized in the body. They are classified as omega-6 and omega-3 fatty acids. Both have cardio protective effects. Omega-6 PUFAs reduce LDL cholesterol while Omega-3 PUFAs lower serum triglyceride. Sources of Omega-6 are various oils used in cooking like safflower, sunflower, soya, corn, canola, peanut, sesame and pulses, nuts, seeds, egg, poultry. Sources of Omega-3 are cold water fish like salmon, sardine, tuna etc; and for vegetarians- flaxseeds, walnuts, soybean, spinach, tofu, cauliflower etc.

Monounsaturated fatty acids (MUFA) are the healthiest fats. They should make up to 10-20% of the total calories. They are found in olive, canola, groundnut, peanut, sesame, rice bran, mustard oil, almonds and avocados.

- Trans fatty acids are produced by heating liquid vegetable oils in presence of hydrogen to make them less liquid. They are found in processed foods, commercially prepared fried fast foods and bakery products. They raise LDL cholesterol and lower HDL cholesterol, making them more dangerous than saturated fats.

Vitamins, Minerals and Antioxidants

Children with diabetes have the same vitamin and mineral requirements as other healthy children.

- It is recommended that individualized meal planning include optimization of food choices to meet recommended dietary allowance for all micronutrients.
- Many fresh fruits and vegetables are naturally rich in antioxidants (tocopherols, carotenoids, vitamin C, and flavonoids) and are strongly recommended for young children with diabetes for cardiovascular protection.

Salt

Children with T1DM are more likely to consume high amounts of salt as the stress is on a “non sweet” diet which may result in hypertension. It would be prudent to restrict salt to 2gm per 1000 calories. Patients should be advised to restrict canned or packaged foods, baked products, pickles, papad, sauces and Chinese food.

Sweeteners

The non-nutritive (artificial) sweeteners are virtually calorie-free. These include aspartame, sucralose, stevia, saccharin and acesulfame potassium. All are fairly safe in amounts recommended by American Diabetic Association, but most children can do without them.

Matching Insulin and Food Intake

The meal plan should be finalized in consultation with the patient and parents. The plan should be built around child’s preferred eating habits (timings and type of meals).

Carbohydrates are the chief proximate principals in food that influence blood glucose. Insulin needs to be matched to the carbohydrate intake at each meal. Protein and fat do not have an immediate effect on blood glucose however; they do contribute to blood glucose rise after many hours of ingestion. For example for a 7-9 year old child the recommended dietary allowance is 1690 Kcal, out of which 55% will be given in form of carbohydrates which is 929.5 Kcal. The amount of carbohydrate in grams is then calculated by dividing calories by 4 (1 gm= 4 Kcal). Among these carbohydrates 70% will be distributed in major meals and 30% in snacks (annexure 1)

If a patient is on split-mix regimen taking a fixed insulin dose, the carbohydrate content too should be fixed for a given meal from day to day. Ideally there should be three main meals, two mid meal snacks to cover the peak hours of insulin action plus a bedtime snack to prevent nocturnal hypoglycemia.

If the child is started on basal-bolus regimen or on insulin pump it is possible to have far greater flexibility. The carbohydrate intake at meal can be varied from day to day. To make this possible the patient would need to calculate the pre-meal insulin dose to match the anticipated carbohydrate intake at that meal. Patients must be taught the carbohydrate content of common foods and snacks and individualized insulin to carbohydrate ratios must be established for different times of the day.

Insulin to Carbohydrate Ratio

This ratio can be calculated using the formula, 500 (300 for toddlers) divided by total daily dose (TDD) of all insulin taken during the day. The value thus obtained represents the grams of carbohydrate that would be covered by 1 unit of rapid acting insulin. Using this ratio, the patient takes a bolus dose just before eating, after estimating the amount of carbohydrate in the meal.

Carbohydrate Counting

Carbohydrate counting is one of the best and easiest methods to optimize glycemic control and improve the quality of life. It is the balance between the carbohydrate intake and insulin dose. Carbohydrates are measured in grams and may be referred to in grams, exchanges, servings or carbohydrate choices. A food that contains 15 gms of carbohydrate is called 1 carbohydrate exchange. A food exchange list contains food items which may be substituted with

any other food item on the same list. One exchange is approximately equal to another in carbohydrate, calories, protein and fat within each food list. This helps to create a meal plan that has a variety of choices, while making sure that consumption of carbohydrates is controlled. A dietician working for T1DM patients can provide an exchange list of all food groups for reference (annexure 2).

Age-group-specific advice

The challenges of nutrition education for children and adolescents with diabetes are often age-related and require consideration of the specific nutrition and developmental needs for different age groups.

Toddlers

- Toddlers have variable appetites. Routine, small meals over the day may promote better glycemic control and nutritional adequacy.
- A variety of tastes, colors, and textures of foods should be encouraged.

School Children

- Meal and snack routine should be incorporated into the usual school timetable.
- Individual advice should be given regarding carbohydrate intake to prevent hypoglycemia particularly for school events such as sports days, camps etc.
- Advice on healthy food choices, food portion size, and physical activity to reduce the risks of inappropriate weight gain and cardiovascular disease is important.

Adolescents

- Emphasis should be placed on the importance of healthy, family-based meals particularly during periods of rapid growth to prevent excessive afternoon or evening snacking.
- Advice should be given on feasting in parties, vacations or under peer pressure to eat appropriately and maintain healthy lifestyle.

Exercise and Physical Activity

The nutritional demands of exercise vary with the type,

intensity and duration of exercise, as well as the age, sex and fitness level; so an individualized approach is required. Prolonged exercising may require calorie intake before, during and after the exercise. The need for carbohydrate immediately prior to exercise will also be related to pre-exercise blood glucose and timing of the last meal or snack and insulin dose. Monitoring blood glucose levels before, during and after physical activity shall help in prevention and management of hypo and hyperglycaemic episodes.

Key Points

- Diet in diabetes is based on healthy eating recommendations and there is no need for restrictive or special diet (exceptions are those with obesity, hypertension, hyperlipidemia, celiac disease etc).
- Caloric requirement is calculated as for any non-diabetic child.
- Meal planning is of utmost importance to match insulin, exercise and meals and prevent hypoglycemia.
- Fixed timings and predetermined carbohydrate content for each meal from day to day are necessary for patients on split-mix insulin regimen
- 45% – 55% of calories should be provided from carbohydrates, 15 -20% from proteins and 30%-35% from fats. Fiber intake is equal to child's age plus 5g is beneficial.
- Carbohydrate counting helps in adding more variety to meal and maintains balance between carbohydrate eaten and insulin taken.
- Nutritional advise for regular and unanticipated physical activity.

Suggestive readings:

- Irani AJ, Nutritional Management. In: Irani AJ, Menon PSN, Bhatia V, editors. Type 1 Diabetes Mellitus in Children and Adolescents in India. 2nd edition. ISPAE; 2017.p.32-43.
- Smart CE, Annan F, Higgins LA, Jelleryd E, Lopez M, Acerini CL. Nutritional management in children and adolescents with diabetes. Clinical practice Consensus Guidelines ISPAD; 2018.p.136-154.

Annexure 1

Menu Plan

Age 7-9 Years

Calories – 1690 Kcal

55% carbohydrates of total Cal = 929.5 Kcal = 232.4 gm Carbohydrates

Carbohydrate Distribution

Meal	%	CHO (gm)
Breakfast	20	46.5
Mid-Morning	10	23.2
Lunch	25	58.1
Evening Snack	10	23.2
Dinner	25	58.1
Post Dinner	10	23.2

Meal Plan

Meal	Food	Amount (in Exchange)	CHO (gm)	Total CHO (gm)
Breakfast	Milk	200 ml	10	45
	Roti/Dalia/Bread/Stuffed parantha	2	30	
	Seasonal Veg	1	5	
Mid-Morning	Fruit	½	7.5	22.5
	BesanChilla small with Veg (2) or kalachana/sprouts chat	1	15	
		1 K		
Lunch	Chapati/Rice	2	30	58.5
	Dal	1 K	15	
	Veg	½ K	5	
	Curd (made with toned milk)	1 K	6	
	salad	½ K	2.5	
Evening Snack	Milk	200 ml	10	25
	Egg	1		
	Fruit	½	7.5	
	Roasted Chana	½ K	7.5	
Dinner	Chapati/Rice	2	30	58.5
	Dal	1 K	15	
	Veg	½ K	5	
	Curd (made with toned milk)	1 K	6	
	salad	½ K	2.5	
Post Dinner	Milk	200 ml	10	25
	Cereal/ Marie Biscuits	3	15	

Annexure 2

Food Exchange list

Cereals

Each exchange gives 15 g Carbohydrates and 70 Kcal

1 Katori (K) = 200gm

Name	Amount
Chappati (25 gm)	1
Bread wheat/multigrain	1
Pav	1
Rusk	2
Rice	½ K (cooked)
Dalia/Suji/Sevian	½ K (cooked)
Oats	¾ K
Cornflakes	½ K
Poha	½ K (cooked)
Noodles	½ K (cooked)
Sabudana	½ K (cooked)
Marie Biscuits	3
Potato	1 medium size (80gm)
Dosa	1 medium size
Uttapam	½
Idli	2 medium size
Popcorn	1 small plate
Murmura	1 ½ K

Milk and Milk products

Each exchange gives 12 gm Carbohydrates and 170 Kcal

Name	Amount
Milk (Toned)	1 Glass (250 ml)
Curd (made with toned milk)	2 K
Paneer	50 gm
Buttermilk	3 Glasses (750 ml)
Khoa	35 gm

Pulses

Each exchange gives 15gm Carbohydrates and 100 Kcal

Name	Amount
Roasted Chana	1 K
Dal	1 K (cooked)
Besan	¼ K
Soyabean Flour	½ K
Sprouts	½ K
Boiled Kala Chana	¾ K

Vegetables

Each exchange gives 5 gm Carbohydrates and 25 Kcal

Name	Amount
Raw Vegetables and Salads	1 K
Cooked vegetables (beans, cabbage, cauliflower, carrot, onion, tomato, turnip, ladyfinger and brinjal etc.)	½ K

Fruits

Each exchange gives 15 gm Carbohydrates and 45 Kcal

Name	Amount
Guava/Apple/Orange/Peach/Pear	1 (medium)
Watermelon	1 K
Musk melon	1 K
Banana	1 small
Kiwi	1
Cherries	12
Strawberries/Raspberries	6-7
Papaya	1 K
Plum	2 small
Mango	½ K
Pomegranate	½ K
Grapes	12

Meat and Poultry

Each exchange gives 0 gm Carbohydrates and 80 Kcal

Name	Amount
Egg	1
Chicken	40 gm
Fish	50 gm
Mutton	40 gm

National Conference on Micronutrients "MICRONUTRICON 2019"

8th September 2019
Venue: India Habitat Center, New Delhi

Registration Form

Name:

Mailing Address:

E-mail:.....

Mode of Payment: Cash/DD/Cheque/NEFT.....

DD Drawn on:NEFT UTR No.....

Cheque no : Amount:

Bank Details

A/c Name : PAN SOCIETY
A/c No : 3757286770
IFSC Code : CBIN0283462
Bank Name : Central Bank of India,
LHMC Branch
PAN No. : AAETP1205E

For	Before 15 th August 2019		After 15 th August 2019
	Doctors/Nutritionist/PG Students*		Doctors/Nutritionist/PG Students*
	Member (in Rs)	Non-member (in Rs)	Member/Non-member (in Rs)
8 th Sept 2019	1000/-	1200/-	1500/-

**on submission of Certificate from the Head of Department*

Conference Secretariat

Dr Praveen Kumar

Director-Professor,
Department of Pediatrics
R.No. 118, 1st Floor, Old Building
Kalawati Saran Children Hospital, Bangla Sahib Marg, New Delhi 110 001
Mob: 8800449672
Email: secretarypansociety19@gmail.com



PEDIATRIC & ADOLESCENT NUTRITION SOCIETY
(IAP SUBSPECIALTY CHAPTER ON NUTRITION)

Society Reg No: Govt of NCT of Delhi/District East/Society/3085/2019

Affiliated to Indian Academy of Pediatrics



Membership Form

1.	Name (In block letters)		
2.	Present designation		
3.	Office/Institutional Address		
4.	Residential Address		
5.	Contact Information	Telephone No. (R) (M) E-mail Id:	
6.	Date of Birth:	7. Nationality:	8. Sex:
9.	IAP Membership No.		
10.	Qualification	Name of the University	Qualifying Year
11.	Details of special training (if any) in Pediatric Nutrition		
12.	List of publications in Pediatric Nutrition (including original work, brief reports, chapters in books) (if needed append separate list)		

Place:

Signature of Applicant:

Date:

Life membership fee: 3000/-, /Associate Life Membership fee – 2000/-

For existing members of IAP Subsociety Chapter: 500/-

Bank Transfer by NEFT - **PAN SOCIETY**, Central Bank of India, LHMC Branch, New Delhi 110 001

A/c No. **3757286770; IFSC: CBIN0283462**

OR

Send (Demand Draft No drawn on) in favor of **PAN SOCIETY** and send it to **The Secretary, Dr. Praveen Kumar, Director-Professor of Pediatrics, R.No.118, 1st Floor, Old Building, Kalawati Saran Children's Hospital, Bangla Sahib Marg, New Delhi, 110001.**



PEDIATRIC & ADOLESCENT NUTRITION SOCIETY (IAP SUBSPECIALITY CHAPTER ON NUTRITION)

Society Reg No: Govt of NCT of Delhi/District East/Society/3085/2019

Affiliated to Indian Academy of Pediatrics



Eligibility Criteria for Membership

1. Eligibility:

- A. Any person who is a residential Indian citizen and is housing a diploma/degree in Pediatrics recognized by Medical Council of India (MCI) and who is member of Central IAP may be elected by the Executive Board as Life member of the Chapter.
- B. Any person possessing MBBS or equivalent degree recognized by Medical Council of India (MCI) and who is member of Central IAP may be elected by the Executive Board as an Associate Life member of Society. Those who are residential Indian citizen will be eligible to become Associate Life member of the Chapter.
- C. The associate Life membership of Chapter shall also include:
 - i. Eligible residential Indian citizen post graduate student in Pediatric duly certified by the Head of Pediatric Department/Child Health concerned.
 - ii. Eligible Master's in Food and Nutrition or fellowship in Nutrition.
 - iii. Eligible non-resident Indian working in the field of nutrition.
 - iv. Eligible foreign national of Indian/non-Indian origin working in the field of nutrition.
- D. Any existing Associate Life member who subsequently satisfies the criteria to be life member may be elected as Life member respectively by the Executive Board at such later date.
- E. Any person who is eligible to be member and undertakes to pay the prevalent membership fees as decided by Executive Committee from time to time and to abide by the rules and regulations of the PAN Society may be elected in the manner here in after prescribed.

2. Membership:

The membership of the society is open to those persons who have attained the age of majority & fulfils the term & conditions of the Society without discrimination of the caste, color, creed but subject to the approval of governing body.

Membership Types:

S.No	Membership Type	Fees	Eligibility
1	Life	3000	MBBS and Degree or Diploma in Pediatric & Member of Central IAP
2	Associate Life	2000	MBBS / Master's in Food and Nutrition