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MESSAGE FROM **MS. SEEMA MODI,**

MANAGING DIRECTOR, HEINZ INDIA PRIVATE LIMITED



It gives me immense pleasure to communicate with all of you through this column. As a Trustee designate of Heinz Nutrition Foundation India, I would like to share a few thoughts. Heinz Foundation, across the world, wants to make a difference to thousands of lives each year through its focus on three core initiatives:

1. Heinz Micronutrient Campaign (HMC), our signature global Corporate Social Responsibility programme;
2. Strategic Grants Programme that focuses on nutrition, diversity and healthy communities; and
3. Heinz employee engagement that benefits people and communities

The world today faces two big issues: malnutrition and obesity. Malnutrition is mostly caused by deficiency of one or more micronutrients. It is estimated by the World Health Organization that a third of the global population, or some 2 billion people, are anaemic, which makes it world's most prevalent public health challenge. The vitamin and mineral deficiency is referred to as a 'hidden hunger.' A hidden hunger is limiting the potential of millions of children around the world by impairing physical and mental development. The Heinz Micronutrient Campaign is dedicated to preventing this hidden hunger. HMC has reached about 3.5MM children in 15 nations through distribution of single serve sachets. The single-serve sachets are mixed into the children's normal meals by parents or caregivers. The powders do not affect the taste, texture or smell of the food. Through vigorous peer-reviewed research conducted around the world, it has been determined that 60 sachets, administered over a four month period, can meet a child's annual vitamin and mineral needs.

Zinc is another important micronutrient which is gaining prominence among the scientific and medical fraternity and we thought it would be fit to present you a story about it in this issue. Dr. Nita Bhandari *et al* have written a very informative article on 'Importance of Zinc in Child Health' covering all aspects like prevalence, consequences and the impact of its deficiency on various functions of the body.

Obesity is another crucial issue which needs immediate attention, lest India would have to face a big challenge in the coming years. Heinz Nutrition Foundation India conducted a symposium on Childhood Obesity in July 2012. Four popular speakers spoke on the subject. A special article and the proceedings of the symposium will be shared with our readers in our next issue of **In Touch**.

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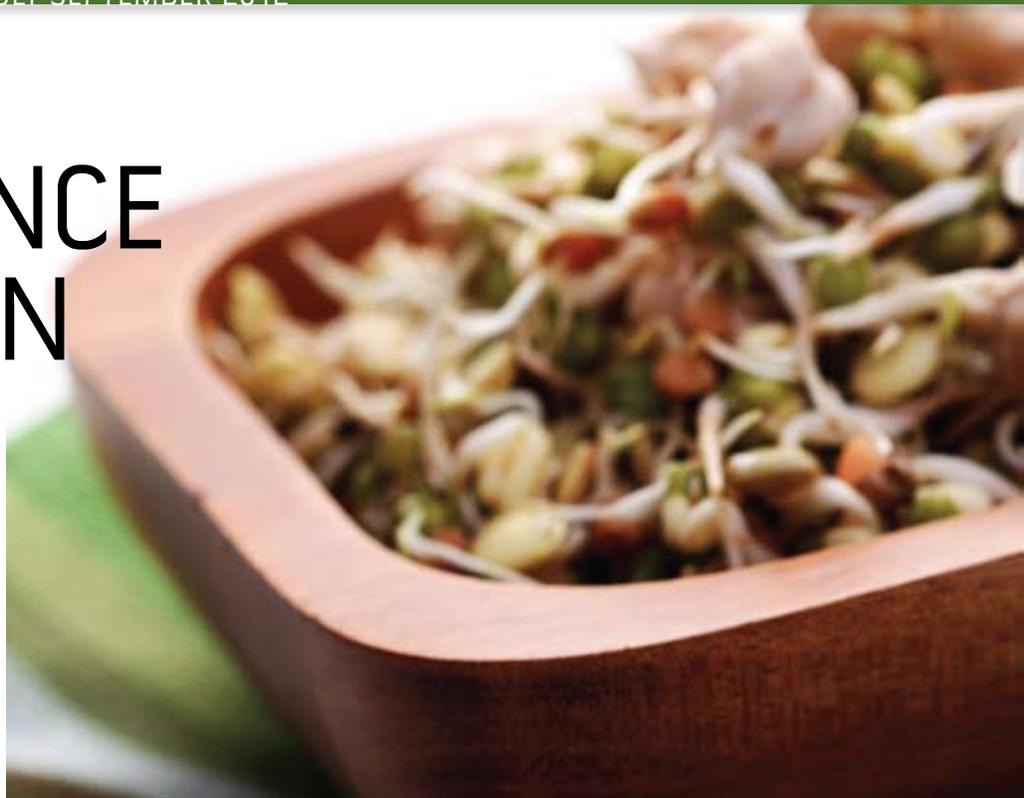
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IMPORTANCE OF ZINC IN CHILD HEALTH



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Zinc is a trace element that is essential to all forms of life. It plays a fundamental role in gene expression, cell development and replications (*Hambidge, 2000*). It is essential for most metabolic pathways and is therefore required for different biochemical, immunological and clinical functions (*Gibson, 2008*).

In the biological system it plays a vital role in gene transcription and translation and in the maintenance of cellular structural integrity and function. It is important for the growth, upkeep of the immune system and resistance to infection in children (*Black, 2003*). Zinc is integral for the cell mediated immune functions and also acts as an anti-inflammatory and anti-oxidant agent (*Prasad, 2008*). The ubiquity of zinc in sub-cellular metabolism and its versatility along with the complex combination of roles that it has in gene expression and cellular growth and differentiation suggests that zinc deficiency may lead to generalized impairment of many metabolic functions (*Williams, 1989*).

PREVALENCE OF ZINC DEFICIENCY

There are no global estimates of zinc deficiency in populations; pediatric or otherwise.

Using food availability data it is estimated that zinc deficiency affects about one third of world's population with

estimates ranging from 4 to 73 per cent (*WHO, 2002*).

Studies have assessed the prevalence of zinc deficiency in India and other countries (*Caulfield, 2004*).

In India zinc deficiency is fairly common in children (Table 1).

TABLE 1. PREVALENCE OF ZINC DEFICIENCY BASED ON PLASMA OR SERUM ZINC IN SELECTED TRIALS

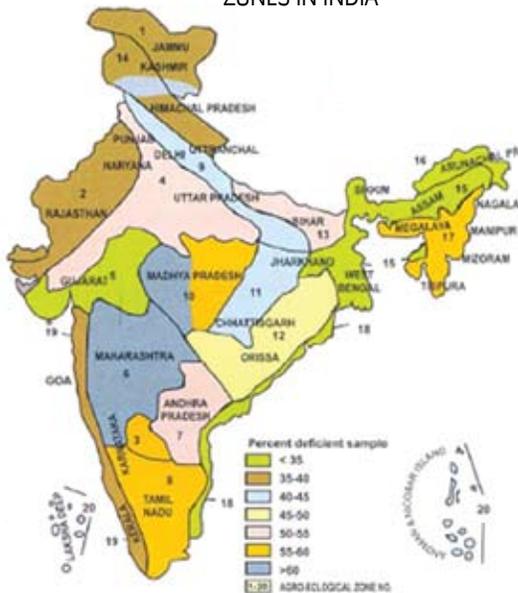
SITE	AGE GROUP	DEFICIENCY (≤ 60 MG/DL)	REFERENCE
India	6-35 mo	33.8%	Dhingra, 2009
India	6-35 mo	36%	Sazawal, 1995
India	12-59 mo	32%	Bahl, 1998
India	6-30 mo	43.8%	Bhandari, 2002

The high prevalence of zinc deficiency observed could be due to various factors. Breast milk may not be a sufficient source of zinc after the initial 5 to 6 months of life and thereafter, low intake and limited diversity of complementary foods including low consumption of animal foods compound the problem. The bioavailability of zinc from cereals and other non animal source foods is low due to inhibitory effects of dietary phytate which are present in whole-grain breads, cereals, legumes, and other foods; they bind to zinc and inhibit its absorption (*Sandstrom B 1997, Wise A 1995*).

The zinc content of soil is low in India which affects zinc content of common foods (Figure 1).

The states of Maharashtra, Madhya Pradesh, Tamil Nadu have highly zinc deficient soils while other areas are mild to moderately deficient (Singh MV, 2000).

FIGURE 1. EXTENT OF ZINC DEFICIENT SOILS IN DIFFERENT AGRO-ECOLOGICAL ZONES IN INDIA



SOURCE: INDIAN INSTITUTE OF SOIL SCIENCE, BHOPAL (SINGH MV, 2000).

In developing countries diseases or conditions involving intestinal mal-absorption are common. This condition along with diarrhoea due to viral, protozoal, and bacterial pathogens causes changes in intestinal tract absorbability and permeability which encourage fecal losses of zinc. Physiological states that require increased zinc include periods of growth in infants and children as well as in mothers during pregnancy.

ESTIMATION OF ZINC DEFICIENCY

Lack of adequate laboratory biomarkers for zinc is a limitation in understanding the prevalence of zinc deficiency (Hambidge and Krebs 1995). Also there are no pathognomonic clinical features of zinc deficiency states.

The most practical available method of estimating the prevalence of zinc deficiency is by measuring serum or plasma zinc levels. At the population level, this method is fairly robust though it lacks sensitivity as the results may be confounded by acute phase response to infections (Brown, 2002). Other methods like estimation of zinc levels in hair or skin are less well

defined. Thus the only practical method for estimating zinc deficiency is to study the response of zinc supplementation on the incidence and severity of common infections, physical growth and cognitive development through conduction of well designed randomized controlled trials.

CONSEQUENCES OF ZINC DEFICIENCY

Severe or clinical zinc deficiency has been described as a condition characterized by short stature, hypogonadism, impaired immune function, skin disorders, cognitive dysfunction and anorexia (Prasad 1991). Severe zinc deficiency is rare but mild to moderate zinc deficiency seems to be more prevalent throughout the world (Sandstead 1991).

Mild to moderate zinc deficiency increases risk of infection in children by impairing the epithelial integrity, cell renewal and immune function.

Studies on biological consequences of zinc deficiency demonstrate decrease in thymulin activity and TH1 cytokines such as IL-2 and IFN- γ . The natural killer cell lytic activity and precursors of T lymphocytes CD8 and CD73 are decreased (Sazawal 1997, Prasad 2007).

Health consequences of zinc deficiency have been studied with regard to incidence and severity of infections like diarrhoea, pneumonia, malaria and tuberculosis. Also there is some data available on cognition, growth and mortality.

ZINC AND DIARRHOEA

Studies have shown that zinc plays an important role in the recovery as well as prevention of diarrhoea.

The therapeutic effect of oral zinc in acute and persistent diarrhoea is well established. A pooled analyses showed that in under five- year-olds zinc supplementation during a diarrhoeal episode reduces the duration and severity of acute and persistent diarrhoea. Children who received zinc during an acute

diarrhoeal episode had a 15 per cent lower probability of continuing diarrhoea on a given day. Zinc administered during an episode of persistent diarrhoea resulted in a 24 per cent lower probability of continuing diarrhoea and a 42 per cent lower rate of treatment failure or death (Bhutta, 2000). In children older than six months with acute diarrhoea, zinc supplementation shortened the duration of diarrhoea by 10 hours and reduced the proportion of children with diarrhoea greater than seven days (Lazzerini, 2008). Zinc supplementation also decreased the proportion of diarrhoeal episodes which lasted beyond seven days and risk of hospitalizations (Walker, 2010). Studies on preventive effect of zinc showed that zinc supplementation of 2-4 RDA daily for two weeks in children in developing countries decreased the incidence of diarrhoea by 11 per cent and diarrhoeal prevalence by 34 per cent. When 1 to 2 RDA of zinc was supplemented for 3 months to over a year the diarrhoeal incidence was reduced by 18 per cent and the prevalence by 25 per cent (Bhutta, 1999). Similar results were observed in a study conducted in Delhi where the incidence of severe diarrhea was reduced by 23 per cent and prolonged diarrhoea by 31 per cent (Bhandari, 2002). Results of more recent meta-analysis showed zinc supplemented children had 14 per cent fewer episodes and 25 per cent less persistent diarrhoeal episodes compared to the placebo group. (Aggarwal, 2007).

ZINC AND PNEUMONIA

Evidence demonstrates the role of zinc supplementation in prevention of pneumonia but the therapeutic effect is not well established.

Children in developing countries who were supplemented with 2 to 4 RDA of zinc daily for 2 weeks showed 41 per cent reduction in the incidence of pneumonia. A reduction of 26 per cent was seen when the children were supplemented with 1 to 2 RDA (Bhutta, 1999). A review of

Children in developing countries who were supplemented with 2 to 4 RDA of zinc daily for 2 weeks showed 41 per cent reduction in the incidence of pneumonia. A reduction of 26 per cent was seen when the children were supplemented with 1 to 2 RDA (Bhutta, 1999).

effectiveness of zinc supplementation in the prevention of pneumonia in children aged two to 59 months concluded that zinc supplementation reduced the incidence of pneumonia by 13 per cent and prevalence of pneumonia by 41 per cent. Chest examination or chest radiograph confirmed pneumonia was also reduced by 21 per cent (*Lassi, 2010*).

With regard to the therapeutic effect of zinc supplementation in childhood pneumonia a recent review showed that zinc when supplemented in addition to standard antibiotic therapy in children with severe and non severe pneumonia failed to show effect on clinical recovery (*Haider, 2011*). A more recent trial in Nepal has shown similar results; adjunct treatment with zinc in children hospitalized with severe pneumonia had marginal benefits that were not significant (*Basnet, 2012*).

ZINC AND SEPSIS IN YOUNG INFANTS

A recent study showed a 40 per cent relative risk reduction in treatment failures in infants aged 7-120 days with probable serious bacterial infection. The results showed that children given zinc were 40 per cent less likely to experience treatment failure than those given placebo. Risk of death was also reduced by 43 per cent (*Bhatnagar, 2012*).

ZINC AND COGNITION AND MOTOR DEVELOPMENT

Studies seem to suggest that zinc plays a role in the cognition and motor functioning of children. A review of published zinc-supplementation trials concluded that there was a relationship between zinc deficiency and cognition and motor functioning in very low birth weight infants (*Black, 2003*). Based on the studies so far there is lack of clear consensus in the evidence linking zinc deficiency to cognitive and motor function indicating the need for additional research

ZINC AND LINEAR GROWTH

Two meta analyses concluded that zinc supplementation results in a highly significant effect on height gain (*Brown 2002, 2009*). Another meta analysis did not show significant effect (*Ramakrishnan, 2009*). Imdad and Bhutta updated and evaluated the existing evidence according to GRADE criteria (Grading of Recommendations Assessment,

Development and Evaluation). They included 36 studies assessing the effect of zinc supplementation on linear growth in children aged less than 5 years from developing countries. The final effect size after pooling all the data sets showed a significant positive effect of zinc supplementation on linear growth. This effect on linear growth is more pronounced when zinc was supplemented alone (*Imdad, 2011*).

ZINC AND MORTALITY

Studies on impact of zinc on mortality have shown inconsistent results. The only Indian study determining the effect of zinc supplementation on mortality used zinc and iron folic acid together and did not report any impact on mortality (*Bhandari, 2007*).

In another trial in a similar setting, 68 per cent reduction in mortality was reported in low birth weight infants who were supplemented with zinc from 1 to 9 months of age as against placebo (*Sazawa, 2001*). A meta analyses showed that zinc supplementation had a non significant 6 per cent (reduction on overall mortality in children under five. In children older than 12 months of age there was a significant 18 per cent reduction in infants 1 to 11 months no benefit was seen (*Brown, 2009*). A systematic review estimated that zinc for the treatment of diarrhoea reduces diarrhoea mortality by 23 per cent (*Walker, 2010*).

A recent review showed a 9 per cent non significant reduction in all cause mortality. The review also showed a non significant reduction in pneumonia and diarrhoea mortality by 15 per cent and 18 per cent respectively. This evidence was rated low since the results were not significant (*Yakoob 2011*).

There is some evidence to show that zinc supplementation decreases cause specific mortality but the limited studies do not permit definite conclusions.

COMBATING ZINC DEFICIENCY ZINC AS A SUPPLEMENT

The Government of India policy- 2007 is that all cases of diarrhoea are to be given zinc along with ORS. The recommendation for subjects aged 2 months to 6 months is 10 mg per day of zinc and in older than 6 months, the dose is 20 mg per day of zinc for a period 14 days. This policy is being implemented in a few states currently and efforts are being made for scale up.

ZINC IN THE DIET

The bioavailability of zinc from the cereals based on phytate rich vegetarian diet is limited. Certain food preparation techniques can be used to reduce the binding of zinc by phytates and increase its bioavailability. These include soaking beans, grains, and seeds in water for several hours before cooking them and allowing them to sit after soaking until sprouts form (*American Dietetic Association 2003*).

FIGURE 2: SOURCES OF FOOD CONTAINING ZINC





CONCLUSIONS

The importance of zinc nutrition in the human body is well established. The role of zinc in morbidity and mortality in children has been demonstrated in randomized controlled trials.

Zinc deficiency is recognized as a public health problem. A lot of evidence has been generated in the last two decades establishing this fact. This problem pertains especially to children under five years of age.

Many other factors can contribute to zinc deficiency, low dietary intake and lack of diversity in foods offered to young children being a predominant factor. The transient deterioration in zinc status or bioavailability of zinc to body tissues because of infection and as a result of stool losses in childhood diarrhea can be improved by zinc supplementation.

In young children the incidence and severity of diarrhoea and pneumonia can be reduced substantially by optimizing intake of zinc. Stunted and underweight children seem to benefit more by zinc supplementation but studies have demonstrated that the benefits of optimized zinc intakes are not restricted to those underweight and stunted. Though the quality of evidence varies, more recent estimates of global data suggest that zinc intake decreases diarrhoea and pneumonia specific mortality. Given these facts it is important that a country like India take adequate measures to improve zinc status of children.

The recent findings in sepsis in young infants indicate that addition of low cost intervention like zinc to the standard antibiotic treatment given to infants with sepsis could lead to substantial improvement, particularly in low and middle-income nations where millions of children die from serious infections every year and where second-line antibiotics and intensive care may not be available.

The current national policy of giving zinc with ORS for treatment of diarrhoea has been shown to have significant preventive

Vegetarians can also increase their zinc intake by consuming more leavened grain products (such as bread) than unleavened products (such as crackers) because leavening partially breaks down the phytate; thus, the body absorbs more zinc from leavened grains than unleavened grains.

Other novel methods could be zinc fortification of food, biofortification of staple food crops with zinc, molecular breeding or transgenic crops or use zinc fortified fertilizer to soil. It has been shown that using zinc fortified fertilizer in zinc deficient calcareous soil improves the yield.

Zinc deficiency is recognized as a public health problem. A lot of evidence has been generated in the last two decades establishing this fact. This problem pertains especially to children under five years of age.





effects on diarrhoea and pneumonia. Efforts to scale up this policy should be strengthened.

Along with the efforts of improving zinc intake, other measures like optimal infant and child feeding as a result of improved income, availability of and access to quality complementary foods, education of women and families by formal and indirect approaches to equip them with correct understanding of appropriate and child feeding practices and measures to reduce morbidity by improved water supply and sanitation are essential.

Efforts taken by researchers to promote zinc fortified fertilizers in India are appreciated. This step is a practical solution given our cultural practices. Varieties and hybrids of essential crops with improved critical nutrients concentrations can be done by molecular breeding which is another promising strategy. More research efforts need to be intensified in this direction to make it a reality.

Irrespective of the means chosen to combat zinc deficiency the most important issue is that the strategy should benefit the poorest who are more likely to have zinc deficiency.

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SYMPOSIUM - A STUDY ON 'CHILDHOOD OBESITY'

DR. P. JAGANNIVAS
MANAGING EDITOR, *In Touch*



PARTICIPANTS OF THE SYMPOSIUM. L-R: DR. A. LAXMAIAH, DR. Y. K. AMDEKAR, DR. BHASKAR RAJU, MS. SEEMA MODI, DR. DHARINI KRISHNAN, DR. P. JAGANNIVAS

Childhood obesity, as you all are aware is a potential hazard of the modern generation due to malnutrition. The national costs of malnutrition are very high: poor health, poor quality of life, decreased mental capacity and reduced worker productivity. It is therefore critical to address this debilitating symptom of malnutrition in children and adolescents.

A symposium was organized by Heinz Nutrition Foundation India as a part of their Continued Nutrition Education (CNE) programme. Participation in the symposium was on invitation basis only.

experience in handling such conditions. He talked about criticality of how it can affect different organs.

Dr. Dharini Krishnan, Ph. D., R.D., is the former National President of Indian Dietetic Association. She has almost three decades of experience in personal diet counselling. She has been there in the print and TV media writing articles and talking about Diet and Nutrition. She delivered a talk on management of obesity.

Dr. Bhaskar Raju, MD., DCH., was the former HoD of pediatric gastroenterology at Institute of Child Health, Chennai. Apart from the academic experience he

appropriate interventions. The increase of obesity in epidemic proportions is mostly due to epidemiological, demographic, nutrition, socio-economic, and lifestyle transition.

The burden of obesity and its complications is shifting rapidly towards the poor. Obesity is now four times more common than under-nutrition in some developing countries. Evidence from Brazil and China point towards a clear shift in obesity and overweight from middle class to the poor. These observations are replicated across many countries in Asia (India), Africa and Latin America. Simultaneous under-nutrition and overweight co-exists and is leading to **DOUBLE BURDEN OF DISEASE**.

Everyone loves chubby children but not many realize that they are not healthy.

SPEAKER	DISCIPLINE	SUBJECT
Dr. A. Laxmaiah	Deputy Director, NIN, Hyderabad	'Magnitude of childhood obesity and preventive strategies' - He had been working on this subject for the last 5 years at NIN
Dr. Y. K. Amdekar	Pediatrician	Obesity - a multiorgan disease
Dr. Dharini	Nutritionist	Nutritional management of obesity
Dr. Bhaskar Raju	Pediatric Gastroenterologist	'Picky Eating Children - Parental attitudes'

The speakers are all specialists in their own fields and they brought along with them their experiences to be shared during the symposium.

Dr. A. Laxmaiah, MBBS, DPH, MPH, MBA, PG Cert.(Applied Nutrition) is the Deputy Director (Scientist 'E'- Epidemiology) and HoD, Division of Community Studies and Officer-In-Charge of NNMB, National Institute of Nutrition, Indian Council of Medical Research, Hyderabad. He is working in the research area of childhood obesity. They have extensive epidemiological and school intervention studies that have been completed since the last 5 years.

Dr. Amdekar MD., DCH., is retired honorary professor of pediatrics, Institute of Child Health, Mumbai. He is also a practicing pediatrician with a vast

is a practicing pediatrician who keeps answering any number of anxious parents about feeding habits. He delivered an interesting talk on a subject like picky eating child.

Childhood obesity is a condition where excess body fat negatively affects a child's health or wellbeing. It is a serious public health concern. The term overweight rather than obese is often used in children as it is less stigmatizing. Malnutrition arises either due to deficiency or excess of one or more nutrients. Overweight and obesity is caused by malnutrition. This public health problem which is increasing worldwide at an alarming rate is seen in developed as well as developing countries (200 m Adults and 18 m children).

Obesity will surpass underweight before the turn of 2020, in the absence of

GUIDE:

ADULTS		
BMI	between 18.5 & 24.9	Healthy weight
BMI	between 25 and 29.9	Overweight
BMI	30 & above	Obese
BMI	40 & above	Morbid obesity
ASIANS		
BMI	between 18.5 & 23	Healthy weight
BMI	between 23 and 27.5	Overweight
BMI	27.5 above	Obese
CHILDREN AND ADOLESCENTS		
BMI	>5th percentile	Thinness
BMI	between 5th & <85th percentile	Healthy weight
BMI	between 85th & 95th percentile	Overweight
BMI	>95th percentile	Obesity

(SOURCE: DR. A. LAXMAIAH)

Some of the common causes are lack of exercise, sedentary lifestyle, diets rich in fatty foods, positive energy balance, lack of fruits and vegetables, over consumption of soft drinks.

Parents are a role model for their children. Children adopt behavior from observation. Parents can either be a good or bad example. It helps to examine one's



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ZINC, THE SECOND MOST IMPORTANT MICRONUTRIENT AFTER IRON

Zinc plays an important role in health and disease. While iron deficiency can be judged clinically and proved easily, zinc deficiency is difficult to diagnose clinically, unless it is severe. However, prevalence of subclinical zinc deficiency in Indian population has been estimated to be around 30 per cent. Recurrent infections may be the only subtle manifestation in children and its role in prevention and treatment of diarrhoea is well established. Enthusiasm has led to correlate zinc deficiency to pneumonia, sepsis, faltering growth and cognitive development but that has not been validated. It is necessary to adopt a cautious approach to consider zinc in isolation and excess of zinc may hinder absorption of copper and iron.

own behaviour and assess the following questions:

- Do we snack very frequently in a day?
- Do we watch TV while eating?
- Do we eat whenever you stressed out?
- Do we eat dessert at every meal?
- Do we skip breakfast?
- Do we have soda rather than milk or water with your meals?

These are the behaviours your children may pick up, which can affect their eating habits now and in the future. Foods are never classified as either good food or bad food. This can restrict eating or lead to negative attitudes towards food. Healthy foods are those that are nutrient-rich or have a large amount of key vitamins and minerals. You don't have to give up your favorite foods, to eat a healthy diet, just try to have your core choices. Colorful fruits and vegetables have more nutrients, lean meats, beans, low fat and fat free dairy and nuts are examples of ideal foods.



Obesity is a multisystem disease. Excess of body fat causes adverse effects on health and 'Weight' is a poor correlate of body fat. Some statistics categorises BMI > 23 as overweight / BMI > 25 as obesity. But WHR is a better predictor of morbidity and mortality than BMI. Normal WHR is 0.7 for women and 0.9 for men. Concept of "thin fat Indian adult" which appeared in one of the issues of In Touch shows that thin adults need not necessarily be fat free. Dexa scan must be used to measure body fat accurately.

Obesity, in fact, affects multiple organs.

Heart and blood vessels, endocrine glands, airways and lungs, GI tract and liver, neurological system, musculo-skeletal system and skin. BP monitoring should be a part of routine health check-up of even normal children. Essential hypertension begins in childhood. Even the mind of a person can be affected by obesity leading to poor self-esteem, anxiety, depression, disturbed peer relationship, social stigmatisation, erectile dysfunction and hypogonadism.

Tracking growth with growth chart helps detect onset of obesity, which should be followed through childhood into adulthood. Early upwards deviation of growth demands physical and biochemical monitoring and periodic physical check on weight, BMI, WHR, BP, hepatomegaly and SMR. Periodic biochemical check of blood sugar, lipid profile, LFT, spirometry, Vit D, uric acid, are recommended.

Children can eat anything they like and there should be no restriction in the quantity of food served to them. They should not be forced to eat what they do not like.

Don't treat your child as special and give him or her 'one litre milk is boiled and made into 200 ml' or adding 4 tsp of beverage in the place of one per cup of milk.

Children who go to school for the first time for a whole day must be taught to eat on their own. Homemade food has to be sent along with them so that they don't depend on available foods at school canteens because most of them contain only high carbs and fats. Never skip breakfast. Skipping breakfast leads to overeating at the next meal and can lead to obesity.

Some common myths are: 'Milk is fattening', 'Cheese is milk in a cup', 'Beetroot and watermelon are rich in iron', 'Keerai (Palak) should not be taken in the night', 'without giving eggs, a vegetarian diet cannot have good protein' and 'Watery vegetables cause a cold.'

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