

Impact of Early Nutrition on Longterm Health

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Abstract

Nutrition in early life, a critical period for human development, can have long-term effects on health in adulthood. The importance of nutrition for health was first recognized through the association between suboptimal diet and deficiency diseases such as scurvy, beriberi and rickets and stunting in children. Early priorities in healthcare therefore focused on defining and providing nutritionally-adequate diets that could support growth and development. Historically, the greatest challenge has been to provide enough food to feed the world's ever-increasing population. However, while under nutrition remains a problem, the nutritional transition occurring in many developing countries has increased the prevalence of poverty as well as obesity.

Keywords: Impact; Early nutrition; Long term health.

Introduction

"Let food be thy medicine and medicine be thy food" ~Hippocrates

Why is Nutrition Important for Children

- Nutrition is very important for everyone, but it is especially important for children because it is directly linked to all aspects of their growth and development; factors which will have direct ties to their level of long term health as adults.
- For example, a child with the right balance of omega fatty acids in their daily diet has a much better chance at creating a more solid foundation for their brain activity and

capabilities later on.

- Likewise, a child who practices a low fat and cholesterol diet on a daily basis significantly improves their chances of preventing a heart attack; even if heart disease tends to be hereditary within their family.

Early Nutrition for Later Health: Time to Act Earlier

- Optimal nutrition in early life not only gives a newborn baby the best start in life, but may also have lifelong positive effects in reducing the risk of a number of chronic diseases, such as diabetes, cardiovascular disease and some cancers.

- Based on current evidence, there are four areas in which poor maternal diet and lifestyle can affect the health of offspring in early life and have long-term adverse health consequences.
 1. Specific nutrients
 2. Energy/calories
 3. Alcohol, smoking and drugs
 4. Mode and quality of infant feeding

Calorie requirement of the children

Age Groups (in years)	Sex	Calories*
2-3	--	1000
4-8	--	1200-1400
9-13	Male	1800
9-13	Female	1600
14-18	Male	2200
14-18	Female	1800

* For active children, calorie requirements may be greater

Nutritional needs of the normal newborn

Nutrients	Value	Nutrients	Value
Calories	110-120/kg/day	Vitamin A	375 mg
Protein	1.9 gram/100 kcal	Vitamin B	0.5 mg/dL
Fat	30% to 55% of total calories	Vitamin E	4 mg
Carbohydrate	35% to 55% of total calories	Vitamin K	5 mg/day
Water	140-160ml/kg/day	Vitamin C	30 mg/day
Calcium	388 mg	Thiamine	0.4mg/100 kcal
Phosphate	132 mg	Riboflavin	0.3mg/100 kcal
Magnesium	16 mg	Folic acid	65 mg
Iron	6-10 mg	Vitamin B12	0.4 mg
Zink	0.5 mg/100 kcal	Pantothenic acid	1.7 mg
Copper	90 mg/kcal	Biotin	5 mg

Specific nutrients:

- Folate and folic acid

Babies born of mothers who have low folate status at the time of conception and in the first weeks of fetal neurodevelopment are at risk of neural tube defects such as spina bifida.

- Vitamin D

Maternal deficiency of this micronutrient increases the risk of rickets, hypocalcaemia seizures and

cardiomyopathy in a baby, and lower bone density at nine years of age

- Iodine

Maternal deficiency of iodine during pregnancy can damage a baby's brain development leading to permanent mental retardation

- Iron

Deficiency of this essential mineral can cause anemia, tiredness and fatigue in the mother and increase the risk of low birth-weight in the baby

- Omega-3 fatty acids

These essential fatty acids are critical for brain development and vision

Energy/calories

- The rising rate of maternal obesity is of particular concern because of the associated risk of pregnancy-related complications such as pre-eclampsia, gestational diabetes, thromboembolism, stillbirth, neonatal death, overweight babies and preterm birth that it presents.
- Maternal obesity is linked to an increased risk of the child becoming obese later in life and suffering from cardiovascular disease more likely to develop insulin resistance, dyslipidemia, high blood pressure and obesity in later life

Alcohol, smoking and drugs

- Alcohol consumption during pregnancy leads to diminished fetal growth, with intrauterine growth restriction and low birth-weight babies who are often born with morphological abnormalities and impairment of the central nervous system leading to delayed neurodevelopment
- Maternal smoking during pregnancy increases the risk of miscarriage, stillbirth, premature birth, and sudden infant death syndrome
- Drug-taking in pregnancy is associated with damage to the fetus and neonatal abstinence syndrome

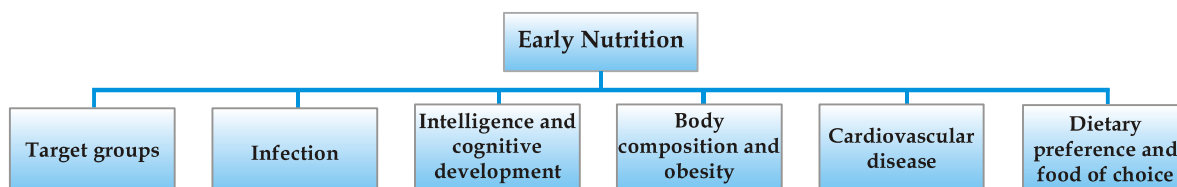
Mode and quality of infant feeding

- Some of the strongest evidence for a link between early nutrition and long-term health derives from research into the benefits of breastfeeding.
- Human milk feeding has been shown to improve cognitive function, reduce the risk of some infections and atopic disease in children with a family history of allergy.
- The growth rates of breast-fed babies, which

differ from those that are formula-fed, appear likely to protect them against respiratory disease, diabetes and obesity in childhood and its later consequences including cardiovascular disease in adult life

Early Nutrition and Health Outcomes

- There is a growing recognition of the need for understanding the etiology of adult disease, and



Optimal Early Nutrition, focusing on 4 Target Groups:

- Women before pregnancy;
- Pregnant women;
- Infants (including breastfeeding);
- Young children.

Women before pregnancy

- Good nutrition can help to ensure a healthy pregnancy. Healthy eating can help to reduce your risk of developing chronic conditions that can affect pregnancy, such as high blood pressure, diabetes, and obesity.
- Periconceptional intake of 400 mcg of folic acid per day by the pregnant women (starting from 1 month prior to 3 months after conception) can prevent 75% of all neuro related defects.
- A nutritious diet can also ensure that you receive the right nutrients to support a healthy pregnancy.

Pregnant women

- Child nutrition begins in utero; programs should focus on improving maternal nutrition during pregnancy to minimize the risk of low birth weight.
- Effects of poor maternal nutrition beyond impaired fetal growth (manifested through low birth weight). Mothers who had lower energy intakes and poorer nutritional status during pregnancy had offspring's who were at risk of having higher blood pressure measurements in adolescence.

Infants

- WHO recommendations for exclusive breastfeeding until six months, timely introduc-

there is now a significant evidence base that links patterns of infant feeding to differences in health outcomes, both in the short and longer term.

- Optimal early nutrition is associated with lower rates of infection in infancy, and with reductions in blood pressure, cholesterol, and lowered risks of obesity and diabetes in adult life.

tion of complementary foods, and continued breastfeeding until two years. Since

- Early infant feeding also had long-term effects on health. Breastfeeding not only protected against morbidity and stunting in childhood, but also lowered the risk of insulin resistance and high triglyceride levels in adulthood among the males.

Young children

- Healthy eating can stabilize children's energy, sharpen their minds, and even out their moods.
- Parents can take to instill healthy eating habits without turning mealtimes into a battle zone.
- By encouraging healthy eating habits now, you can make a huge impact on your children's life-long relationship with food and give them the best opportunity to grow into healthy, confident adults

Infection

- Long term health is an outcome of appropriate early nutrition which seen multifold ways one such is infection. Breast milk has been described as the "communication vehicle" between the maternal immune system and the infant.
- It contains a wide range of bioactive factors, including immunoglobulin, lymphocytes, neutrophils, cytokines and other anti-inflammatory compounds.
- These factors influence immune status by providing protection, but also promote immune development and facilitate development of tolerance and an appropriate inflammatory response responsible for later health.

Intelligence and cognitive development

- Brain growth is rapid in the first year of life,

and slow growth in infancy predicts poor cognitive performance in later life and lower educational attainment

- Dietary patterns "track" in childhood may reflect continued exposure to diets that provide an optimal supply of micronutrients to support cognitive development.
- Children whose weaning diet was characterized by higher intakes of fruit, vegetables and home-prepared foods had higher scores on tests of full-scale and verbal intelligence at age 4 years.

Body composition and obesity

- Nutrition during early development has an important impact on later health.
- As a number of epidemiological studies have shown a lower risk of obesity in children and adults who were breastfed, infancy has become a focus of public health interest as a critical period that could be targeted for obesity prevention.
- According to the WHO, overweight and obesity are among the five leading causes of death globally. Rates of obesity and especially childhood obesity have rapidly increased all over the world during the past two decades, and continue to do so in many countries.
- Overweight is associated with severe health problems and premature death due to diabetes, hypertension, cardiovascular diseases and many other non-communicable diseases.

Body mass index (BMI)

- Body mass index (BMI) is used to infer information about adiposity.
- Specifically, BMI is calculated using a formula
- People with a body mass index over 25 are considered overweight, while BMIs reaching over 30 constitute obesity.

Cardiovascular diseases (CVD)

- Nutritional factors in childhood have been shown to be particularly important in this process and have major impact on conventional cardiovascular risk factors that affect vascular health and life time CVD risk.
- Attention to nutrition throughout the life course (and not just in adults) is therefore important in prevention of CVD.
- Nutrition intervention to children aimed at primary prevention of CVD.

Dietary preference and food of choice

- Parental influence on children's food preferences and energy intake is most important activity. Latest research suggests that the food preferences of young children could be related to their risk of becoming obese later in life.
- While multiple factors influence eating behaviors and food choices of children, two potent forces are peer pressure and exposure to TV food advertising leads to intake of junk foods.
- There is now a consensus that the nutrients obtained from a diet high in fruit and vegetables can contribute to the prevention of cancer and cardiovascular disease and, in addition, may displace other foods from the diet, thereby indirectly reducing fat consumption.

Conclusion:

Early nutrition – a window of opportunity"

Early life nutrition is therefore an important 'window of opportunity', when the potential health and life chances of infants and children can be maximized, and the risks of poor health, growth and development can be minimized thus leading to the healthy lifestyle.

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