

Nutrition in Healthy Children

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1. Introduction

The most significant factor in the development and growth of a country is providing effective health care services to society. The purpose of each health care application is different. Among these applications, the factor that accelerates the growth and development, living healthy, protection from diseases, and healing is nutrition (Baysal, 1993; Perk, 1992).

Nutrition is a basic need that affects the lives of individuals and societies, and is affected from all biological, social, cultural and economic factors. Adequate and balanced nutrition is unquestionably a precondition for the generation of healthy societies (Allen & Gillespie, 2001).

Ensuring the existence of the living organism, putting his/her losses into place, getting the needed food stuffs, by means of digestion to fulfill the necessary physiological functions for survival is called *nutrition*. *Healthy nutrition* means the use of food to maintain the growth-development and survival and to protect health (Perk, 1992).

Nutrition has a very important role in the development of both individual's and society's health. Good nutrition is necessary for the individual to grow and develop, maintain his/her physical and mental health and resist to diseases, especially infectious diseases (Bilgel, 1997).

Nutrition in the family is related to whether the sources required by the family are adequate or not to meet their nourishment, the manner of their food preparation and consumption, their socio-cultural and economic level, the environment that they live, the size of the family, their birth rate, age of the mother and personal characteristics of the individual (Inanc & Hatipoglu, 1995).

Nutrition has more significance in terms of the child's health (Baysal, 1993; Bilgel, 1997), because the period of life in which development and growth occur most intensively and most rapidly is the childhood period (Bilgel, 1997). The most significant factor having positive or negative effects on the development and growth of the child after birth is his/her nutritional status (Kavaklı, 1992). Majority of the children comes into the world healthy. In order to sustain the healthy status and enable the organism to complete its normal development and growth, the child should be nourished adequately in terms of the food's composition and amount beginning from the first days and at every period of the childhood (Baysal, 1993).

Accomplished nutrition plays a major part in healthy growth and development of a newborn infant. Infants in various countries of the world are exposed to malnutrition because of social, economic and cultural reasons. Inadequate and unbalanced nutrition leads growth and development failures and deaths among children (Yapicioglu et al, 2002).

Whereas neonatal mortality rate per a thousand live births is 26 in the world, 40 in Africa, 7 in Europe, 35 in East Mediterranean countries according to the report of 2010 World Health Organization (WHO), this rate is 14 in Turkey (WHO, 2010). With regard to 2010 WHO report it is stated that infectious diseases such as diarrhea, pneumonia and bronchitis are the leading diseases that cause infant deaths in developing countries, and one of the easiest ways to prevent these infections is breastfeeding (WHO, 2010). Death rates of infants who are not breastfed are 4-6 times more than the breastfed ones. According to WHO, the high ratio of nursing mothers contributes to survival of infants at an annual average of 1.5 million (Baysan et al, 2009). In a research conducted by Wilson and his colleagues it is determined that the probability of catching respiratory diseases among infants who are at least 15 weeks old and regularly breastfed is low. The probability of catching respiratory diseases is 17% for the infants at least 15 week old and particularly breastfed, it is 26.8-35.2% for those partially breastfed, and it is 30.7-33.7% for those only bottle-fed (Wilson et al, 1998).

According to Turkey Demographic and Health Survey (TDHS 2008), the 68.9% of the infants between 0-1 months are exclusively breastfed. When they are 2-3 months-old this ratio decreases to 42%. Moreover, the ratio in which the newborn infants are breastfed within the first 1 hour is 39%, that within the first day is 73.4%, and the ratio of those who are fed with other nutrients before mother's milk is 23.2% (www.scribd.com/doc/21717405/TNSA-2008-ana-Rapor-tr, 172).

Malnutrition problems in Turkey are particularly observed during the infancy. The 12.2% of the infants under the age of five suffer acute and chronic malnutrition (TDHS 2003). Anemia can also be considered among malnutrition problems. In our country an average of 50% in preschool age, the 30% of school children, and 50% of the pregnant or breastfeeding women are anemic. Primary causes of anemia are the iron deficiency, vitamin B6, vitamin B12 and folic acid intake or their low bioavailability (TUIK, 2006). Furthermore, unbalanced nutrition is an important health concern in the World as it is in Turkey. The widespread availability of fast-food style, nutrition with monotype food, and sedentary lifestyles led the increase in adiposity caused by unbalanced nutrition (Aslan, 2007; TDHS, 2003). Adiposity in childhood period draws attention as a growing concern both in the world and in our country.

To raise healthy and productive generations, the childhood period that lasts from impregnation to the end of adolescence along with the growth-development within this period are crucial for the future of societies. While Maslow places nutrition to forefront among required physical needs (in Hierarchy of Basic Human Needs) Henderson underlines the importance of the subject by claiming that adequate and balanced nutrition comes in the first place among 14 basic needs (Birol, 1997).

Whatever the long-term benefits of nutrition are, ensuring people they would have good nutrition falls to the international laws. This law issue has been expressed in various ways at international declarations and documents about human rights since the Declaration on Rights of the Child was adopted in 1924 (Bellamy, 1998).

The requirements stated below should be met in order to determine the adequateness of nutrition, and to discuss clinical adequacy of the nutrition:

1. Providing the energy that is spent by basal metabolism, and that is used to maintain life functions,
2. Providing the energy that is spent in daily activity as a result of muscle movements,
3. Providing with the building blocks that is needed by organism and required for regeneration and synthesis process,
4. Letting an infant who has a growing and developing organism take the nourishment in ideal quality and quantity for sustaining this feature (Arcasoy et al, 1994).

As the concept of adequateness in nutrition is searched, the problem of what kind of nutrition the human organism needs in various age periods under the environmental and living conditions has come up. The most practical standard to determine the adequateness in nutrition is that the child keeps his/her birth weight and height within the percentile channel where he/she begins to live (Arcasoy et al, 1994).

In order to overcome the nutrition problems, the importance of eliminating social inequalities which are the basic source of the problem should be emphasized by highlighting that health services constitute an equal, costless, qualified and reachable right. Also preventive health services should be prioritized among the health services.

2. Nutrition requirements

The foods include 3 essential nutrients which are protein, carbohydrate and fat, in different ratios. All the energy (calorie requirement), building blocks (amino acids, fatty acids), vitamins and minerals are taken to the organism by means of the nutrients. Requirement of each one changes depending on the environment where the individual lives and his/her daily activity. The suggested values in numerical expression of the requirement are given according to the age, body surface (m^2), weight (kg) and height (cm) of the individual. Although it is advocated that the ideal evaluation is the rating of body surface to weight or to height and the second rank belongs to m^2 , the most commonly used one is the criteria of age-weight in practice. Example: The calorie requirement of 0-3 month-old infant is 120 Kcal/kg (Arcasoy et al, 1994).

In the first 4-6 months of life, breast milk and various infant formulas can provide with the complete nutrition to a growing infant. Still, breast milk is recommended nearly for all infants as the source of nutrient. However, very few numbers of infants are fed through only breastfeeding for more than 2-3 months. In this regard, all kind of efforts should be made to encourage breastfeeding. Another option is iron-fortified formulas which support sufficient growth of infants. These formulas are not the only ways to give nutritional supplements. Following the months 4-6, solid foods and fruit juice are being introduced in a manner such that they will gradually substitute the nutrients and calories that came from breast milk or formula. Because infants' activities increase in this period (despite a decrease in growth rate) their energy requirements also increase. A diet (milk) which has relatively high fat content and high calories is required to provide them with adequate energy. Nutritional supplements start forming a source for some important nutrients (iron) within the second 6-months. Genetic coordination of neoplasm is remarkable. However, a variety of nutritional

deficiencies may be restrictive on one of these growth functions. Energy and nutrition requirements are generally proportional to Body Muscle Mass (BMM); as the child grows up, these requirements increase and reach to higher BMM. These requirements are very low for women compared to men, because mass of fat is higher and BMM is lower in women. In terms of some nutrients, the requirements of girls may be more than the requirements of boys or they may be equal like iron or vitamin C. In order to meet the requirements of suggested daily nutrients, a girl should have a richer diet in terms of nutrients compared to a boy. Hence the deficiency risk of some nutrients is higher for girls (Tershakovec, & Stallings, 1996).

Nutrition requirements: The minimum nutrition requirement of any food is determined as the amount below the consumed level that would show deficiency. It is determined that the daily nutrient requirement is 2-6 times of the minimum requirement, and the daily nutrient requirement is calculated by taking weight, gender, age and the requirements in pregnancy and lactation into consideration. Calorie requirement is calculated more frequently depending on the requirements below: 100 kcal/kg for the first 10 kg, 50 kcal/kg for 10-20 kg and 20 kcal/kg for over 20 kg (Tershakovec, & Stallings, 1996).

2.1 Energy requirement

The measure of the organism's energy requirement is the units of "calorie" or "joules". "Kcal" is practically used both in the world and in our country (Arcasoy et al, 1994). One kilocalorie is the required energy amount to raise the temperature of one kilogram of water from 15°C to 16 °C. Fats, carbohydrates and proteins are used as the source of energy. 1 gram of oils, 1 gram of carbohydrates and 1 gram of proteins generate 9 kcal, 4 kcal and 4 kcal, respectively. It is desired in a well-balanced prepared diet that each contribution of the carbohydrates, fats and proteins to total energy is 50%, 35% and 15%, respectively (Coskun, 1996).

In general, 4 criteria are used to determine either the energy requirement or other requirements.

1. The requirement for basal metabolism (BM): is calculated according to m^2 . The shares that the organs take from BM according to the age period are different in childhood period. For example: the brain of an infant uses 2/3 of BM energy, whereas this ratio is 1/4 for adults.
2. A requirement obedient to physical activity should be calculated.
3. Specific-dynamic effect (SDE) of the nutrients: While the energy use of the organism is calculated, SDE of the nutrients accounts for a low ratio such as 5-10%.
4. The required energy for growth-development (G/D): It is calculated that 3.5-5 Kcal are needed in order to increase the weight of an organism by one gram. Rapid growth during infancy requires rapid energy consumption. It is estimated that 1/4-1/3 of the total energy taken within the first months of life is used for G/D (Arcasoy et al, 1994).

Since the growth rate is high in the first years of the childhood period, the requirements for energy and the other nutritional elements are unexpectedly higher than the body mass. For example, whereas the energy and protein requirement of a moderately active woman at a weight of 40 kg is 40 kcal/kg and 1 g/kg, respectively, these requirements for an infant in the first six months of life are three times of the stated values (Coskun, 1996).

2.2 Nutrition types for infants

1. *Nourishment through breastfeeding*: It is the most ideal diet for the newborn infant (Coskun, 1996). World Health Organization (WHO) and American Pediatrics Association (APA) suggest that the newborn infants should be breastfed exclusively, nutritional supplements should start as of the sixth month, and the breastfeeding period should last beyond two years and more (1 year and more-APA) (APA, 2003).

The ingredients of breast milk make mother milk as the most suitable nutrient for infants. This is due to the fact that the ingredients of mother milk change according to the requirements of newborn, besides it is protective against the infections, while it is affordable, as well. Mother milk, thus, meets all the physiological and psychosocial requirements of an infant alone by itself within the first 4-6 months (Dallar et al, 2007; Tuncel et al, 2005).

- *Exclusively breastfeeding*: The infant is fed only with breast milk of its mother or a wet nurse. Otherwise, any liquid food (except vitamin drops and syrups, drugs) or solid food is not given (Beaudry, 1995; Coskun, 1996).
 - *Nutrition in which breastfeeding is dominant*: The essential nutrition source of the infant is breast milk. Additionally, liquid beverages, sugared water, tea, fruit juice, vitamin drops and syrups, medicine can also be given (Beaudry, 1995; Coskun, 1996).
 - *Mixed Nutrition*: In addition to breast milk, semi-solid and solid foods are given to child.
 - *Nutrition in weaning period*: It is the period which follows the breastfeeding for 4-6 months, breastfeeding is kept but nutritional supplements are also newly added to meet the infant's requirements.
2. *Artificial Nourishment*: It is the diet in which the infant cannot be breastfed due to the problems arising from itself or its mother as a result of misfortune (Coskun, 1996). If it is possible in this nutrition, infant formula milk (industrial milk) which is very similar to breastmilk should be used. Under the clean and proper preparation conditions, digestion problems are seen scarcely and the drawbacks of artificial nutrition are minimized in use of infant formula milk. However, it should be known that these nutrients will create economic burden for the family.

Age	Amount	Meal/day
1-2 weeks	50-70 ml.	7-8
2-6 weeks	75-110 ml.	6-7
2 months	110-180 ml.	5-6
3 months	170-220 ml.	5
6 months	220-240 ml.	4

Table 1. Artificial nourishment (Tuncdogan & Tuncdogan, 2005).

The infant should pass 3 consecutive periods which have the terms and characteristics compatible with the growth physiology of the child. These are: Exclusively breastfeeding, weaning, nutrition with modified foods for adults (Ozalp, 1996).

2.2.1 Energy and nutrient needs of infants

Nutrient and energy needs of the children differ from the adults'. Due to the generation of new tissues within infant's body, the need for proteins, minerals and vitamins is high. Significant amount of energy is necessary in growth period. Because the children have not learnt eating food by themselves yet, the diets that will be prepared for their nutrition should be in conformity with the child and include definite nutrient elements (Netsel, 2003).

Energy Needs of Infants:

- 120 calories per kilogram between 1-3 months
- 110 calories per kilogram between 4-9 months
- 105 calories per kilogram between 10-12 months (Netsel, 2003).

Majority of the calories are provided from fats and carbohydrates. The carbohydrate (lactose) and fats within the breast milk are absorbed easily (Netsel, 2003).

Infant's need for protein is substantially high. Intake of qualified and adequate protein is a requirement, since the growth of body tissues requires continuous protein synthesis. Breast milk has the characteristics of sample protein. The digestion rate of the sample protein accounts for 95%.

2.2.2 Vitamins and minerals

The daily average need of an infant for vitamins and minerals are:

Vitamin A : 1500 I.U.

Vitamin D : 400 I.U.

Vitamin C : 20- 30 mg

Vitamin B 6 : 0.3-0.6 mg

Vitamin B12 : 1- 2 mcg

Folic acid: 40- 60 mcg

Calcium: 500 mg

Iron: 5-10mg (after 6th month)

Iodine : 50 mcg

Phosphorus : 400 mg

Zinc : 5-10 mg

Potassium: 4- 8 mg (Koksal, 2007).

Breast milk can meet an infant's need for vitamins and minerals up to 4th-6th month under normal conditions. Afterwards the need should be met by means of the nutritional supplements (Koksal, 2007).

2.2.3 Nutrition of infants in the first 6 months

The ideal nutrition for infants is exclusively breastfeeding the first 6 months, then starting to get proper nutritional supplements and the continuation of breastfeeding for two years. It is estimated that breastfeeding will be able to prevent 1.3 million infants from dying every year. If inartificial nutrition cannot be provided, artificial nutrition or mixed nutrition are applied (APA, 2003).

2.2.3.1 Breastfeeding

With respect to "The Innocenti Declaration" that WHO and UNICEF published in 1990, it is suggested that the conditions are created to enable the women to breastfeed commonly, the necessary information about this subject can be reached easily, to begin breastfeeding within

half an hour following the birth is encouraged, anything like fake breast or infant pacifier is not given to the breastfeeding infant, exclusively breastfeeding is kept up to the first 4-6 months and then breastfeeding with nutritional supplements is applied in the following period (Arcasoy et al, 1994; Bellamy, 1998; T.R. Ministry of Health General Directorate of MCH/FP, 1997; Tuncel et al, 2005).

2.2.3.2 Characteristics of the breast milk

Breastfeeding is the most appropriate diet for infants to let them grow and develop healthily. The first year of the infant is extremely important in terms of laying the foundations of a healthy life. Adequate and balanced nutrition is provided in infancy through the breast milk of each infant's own mother. It is exclusively sufficient for 4-6 months to give the infant breast milk of its mother without giving water beginning from the birth and observe the growth (Bertan & Guler, 1995). Since 87% of breast milk consists of liquid, in the first six months the infant does not need anything like water or similar liquid nutrients, except the breast milk (Gokcay & Garibagaoglu, 2002).

We can summarize the superiorities of breast milk: it is suitable for the growth rate of the infant in terms of its composition, it is digested easily and there is not any loss in digestion, it is non-allergic, economic, clean and sterilized, furthermore it does not require special preparation, it has protective elements against the microbes, toxic elements that will give harm to the infant are at minimum level in breast milk, it strengthens the affection relation between the mother and the child, it assists the mental health of both to be protected (Baysal, 1993; Ozalp, 1996). In breast milk, there are different growth factors having effects in infant's growth that are demonstrated by means of *in vivo* and *in vitro* studies. Tiny molecules such as taurine, ethanolamine, phosphoethanolamine, and proteins such as "epidermal growth factor", "nerve growth factor" which look like hormones and interferon affect the growth and development by affecting the mammary gland or distinct organs of infants (Ozalp, 1991). Besides that taurine is one of the factors in breast milk that orders the growth, it is known that it provides the coherence of cell membrane and prevents the destruction of retina (Ozalp, 1996).

2.2.3.3 Content of breast milk

Breast milk is the unique ideal and physiological nutrient for the newborn. It supplies all feeders according to requirement of the infant in an organized and sterilized manner. Moreover when breast milk is compared with the infant formulas which are sterilized but "inert" because of enabling the mother to adapt to the microbial environment where she is, and providing the infant both general and specific anti-infective factors, breast milk is a "living" biological liquid. Even though macro-feeders are imitated for their concentration and content in the sense of "static", supplying the micro-feeders at-will cannot be always guaranteed. For example, the existence of a different whey casein ratio in the formula affects the infant's cholesterol levels in blood. While whey casein ratio in breast milk is 63:37, this is 18:82 in cow's milk. Although the ratio of 60:40 in infant formulas that are regarded as "humanize" is adopted nowadays, rich formulas (20:80) have been generated from the casein within last 10 years because of its affordability. It was found that blood cholesterol levels of the infants who had been fed with these formulas were high, in which only the protein ratio was modified and lipids remained the same (Civi et al, 1997).

2.2.3.a Colostrum

The breast milk which is lactated within the first 4-5 days following the birth is called *colostrum*. The milk turns into *transitional milk* in the next days by changing its structure. It takes the form of *mature milk* within thirty days (Arcasoy et al, 1994).

Colostrum is a yellowish liquid having pH 7.7 approximately. Its structure is different from the mature milk and it has the characteristics of retention liquid (Arcasoy et al, 1994; Ok, 1991; Ozalp, 1996).

Colostrum has a rich content in terms of minerals, vitamin A, IgA. Its sugar and fat content is lower compared to the following milk (Ok, 1991; Özalp, 1996).

Protein: Its rate is an average of 2.2% g.

Carbohydrate: Lactose rate is lower than it is in mature milk due to the resorption of lactated liquid from the breast again. Its rate is an average of 4-5% g (Arcasoy et al, 1994). The concentration of breast milk is not affected from the mother's diet. Lactose is influential in the absorption of calcium within the milk. The compounds of lactose's galactose component with lipids are essential for the development of brain tissue (Ozalp, 1996).

Fat: The fat rate is low in the first days; afterwards it is 3% g approximately (Arcasoy et al, 1994).

As lactation increases, the total protein and mineral levels decrease and the level of fat, lactose and frequently vitamin B1 increase (Arcasoy et al, 1994).

Energy: It is 570 Kcal per liter approximately (Arcasoy et al, 1994).

Immunoglobulins: All structural factors for the development and protection of the newborn are available in colostrum. Colostrum is very rich in terms of the immunoglobulins. After the first breastfeeding, the mouth and gastrointestinal mucous is covered by secretory IgA. These interlink the toxins, bacteria and macromolecular agents and prevent their absorption from intestinal epithelium. Moreover, they have the function of stimulating infant to form its own IgAs. In the first days most of the cells in the colostrum comprise of neutrophils, and macrophages in the next days. Both cell types protect the infant from infections through the synthesis of phagocytosis and interferon. Half of the lymphocytes in colostrum are T-lymphocytes. B lymphocytes constitute IgA and also it is discovered that they are able to generate interferon when they are stimulated by viruses (Arcasoy et al, 1994).

As the volume of milk decreases through the end of lactation, immunoglobulins increase again. Thus, both the infant and the breast are protected (Arcasoy et al, 1994).

The amount of *taurine* in colostrum which is a necessary amino acid for the newborn, is 7-8 times more than the cow's milk in 3th-7th days (Arcasoy et al, 1994).

Rather than for the nutrition of newborn (in any case, the energy and water requirements of a 3-day-old infant is minimal), colostrum is beneficial for protecting the newborn from the microbes in external environment and preparing it for the function of gastro-intestinal system (Ok, 1991).

Breastfeeding within the first half an hour after the birth is a crucial factor for not delaying the increase in the amount of milk, and it affects the total breastfeeding period positively (Richard, 2001; TR Ministry of Health, 1996; Yurdakok, 2004).

2.2.3.b Temporary milk

The milk in the period of 5-10 day-old infant is the temporary milk. The concentration of phosphorus is higher in transitional milk than it is in the colostrum or mature milk (Ok, 1991). It contains fat, lactose and vitamin in higher rates than the colostrum and its calorie value is also higher (Taskin, 1997).

2.2.3.c Mature milk (breast milk)

Color of the breast milk is white and its pH is 6.97 (Arcasoy et al, 1994).

Lactose is the most important component of the carbohydrates in breast milk. Its rate is higher in breast milk than it is in cow's milk (7.1 g/dl and 4.1 g/dl). The compounds of lactose's galactose component with lipids have a significant role in the development of brain. Also, it facilitates the calcium absorption and affects the bone mineralization positively. The indigestible part of lactose has role in the development of acidophilic bacterial flora (*Lactobacillus bifidus*) in intestines as fermented, and prevents reproduction of the pathogen microorganisms (Gokçay & Garibagaoglu, 2002; Oran & Yurdakok, 1996).

Whey protein, which is digestible and rich in biological value, constitutes the 60% of the protein content (which is almost 18% in cow's milk). Alfa-lactalbumine makes up the significant part of the whey proteins and has a function in the lactose synthesis in the breast alveoli. Most of the whey proteins are anti-infective proteins and protects the infant from infections. Lactoferrin, lysozyme, emunctory immunoglobulin-A and other types of immunoglobulin, nucleotides, and growth factors play key role in immunity. The rate of casein that is less digestible is lower in breast milk than it is in cow's milk (40% and 80%) (Gokcay & Garibagaoglu, 2002; Oran & Yurdakok, 1996).

The protein content in breast milk is less than it is in cow's milk (1.1 g/dl and 3.2 g/dl), but its biological value is higher and it meets the protein requirement of the infant alone (Oran & Yurdakok, 1996).

The nucleotides in breast milk increase the protein utilization. When amino acids are insufficient through diet, nucleotides are used in the synthesis of proteins and non-essential amino acids. It is known that there are 12 distinct nucleotides in the breast milk and inosine phosphate among these increases the absorption of iron in the breast milk (Ozalp, 1996).

Carbohydrate: Lactose within the breast milk is almost 7% at average. Lactose of the breast milk is more digestible than the lactose in cow's milk (Arcasoy et al, 1994). Lipids which supply 50% of the calories in breast milk are more in breast milk than they are in cow's milk (4.5 g/dl and 3.8 g/dl) and they exist in the form of fat globules. Lipase in breast milk promotes the digestion of fat even in low bile level. Furthermore, the breast milk has a rich content in terms of long chain poly unsaturated fatty acids such as arachidonic acid, docosahexaenoic acid, linolenic acid and alfa linoleic acid all of which are in the structure of nerve cell and retina cell and have role in the development of the nervous system and

optical functions. Particularly, milk of the mothers of premature infants has higher amounts of long chain unsaturated fatty acids. The fat rate in breast milk changes during the breastfeeding period. The fat rate which is low at the beginning of breastfeeding rises through the end of breastfeeding. This situation creates the feeling of fullness for the infant and prevents the adiposity to occur. Phospholipid and cholesterol contents in the breast milk are high in the early lactation period. It is argued that this situation can be influential on the early activation of lipid enzyme system and the prevention of hyperlipidemia and atherosclerosis (Gokcay & Garibagaoglu, 2002; TR Ministry of Health, 1996).

Lipid: The fat level is quite variable depending on mother's diet. Its structure has the characteristics of vegetable oil, its level changes between 3.5-4.5% g (Arcasoy et al, 1994).

Minerals: While the level of minerals in breast milk is 3 g in the first 15 days following the birth, it falls gradually afterwards. The absorption of the calcium in breast milk is more than it is in cow's milk. Ca/P ratio in the milk is 1/2. The levels of Zn, Co, Cu and Se are higher than they are in cow's milk. The lower level of mineral in breast milk creates less osmotic pressure on the kidney and supplies safe nutritional source in the first months for the infant who has functional defects. The celitis load of kidney is 75-90 mOsm/L for the breastfed infants, whereas this is 228 mOsm/L for the ones who are fed with cow's milk. Thus, maintaining the fluid balance is a lot easier among breastfed infants (Arcasoy et al, 1994; Gokcay & Garibagaoglu, 2002; Ozalp, 1996; Schack & Michaelsen, 2006).

Immunoglobulin types and enzymes: IgA in the breast milk has antibody activity against many gram (+) and gram (-) bacteria, various viruses and *Candida albicans*. IgM and IgG pass immediately from the mother's serum to the infant (Arcasoy et al, 1994).

Lysozyme level in the breast milk is approximately 5000 times higher than the Lysozyme level in cow's milk. Similarly, this enzyme has protective function against gram (+) bacteria and some virus infections. Some of the enzymes in the milk have immunological function and some of them affect the cell ripening indirectly (Arcasoy et al, 1994).

Lactobacillus bifidus flora that reproduces within the intestines of breastfed infants prevents the pathogenic bacteria to reproduce. The nutritional supplements that are given soon after the birth destroy the protective mechanism by preventing these bacteria to reproduce (Arcasoy et al, 1994; Coskun, 1996).

Breast milk is vitally important for the protection, nutrition and development of 4-6 month-old infants. In addition to that the breast milk in every period is not the same at every meal, it undergoes modification in the periods in which the infant starts breastfeeding and ends. The milk of the premature infant's mother is different from the milk of mother who has a infant in time, and it is adjusted for the growth of little infant more rapidly and healthily. Depending on that how early this infant was born, the breast milk is ideally adjusted; at first protein, calcium and iron are increased, all the other nutrients, except phosphorus are adjusted nearly for that infant (Ok, 1991).

Fat and water soluble vitamins in breast milk, except vitamin K and vitamin D are at adequate level for infants. Since the intestine flora has not developed exactly yet, vitamin K is applied through parenteral or oral passage in order to prevent the hemorrhagic disease of

the newborn. 400 IU of vitamin D supplement is required daily beginning from 15th day up to the end of the first year to meet vitamin D requirement (Gokcay & Garibagaoglu, 2002; Oran & Yurdakok, 1996).

Studies about the breastfeeding physiology demonstrated the existence of the hormones in the breast milk such as adipokine, leptin, adiponectin, Insulin-Like Growth Factor I (IGF-I), ghrelin, obestatin and resistin. Human milk is a complicated liquid. Leptin and ghrelin hormones are synthesized and secreted to breast milk by mammary gland. Leptin and ghrelin hormones protect the child against the obesity in his/her childhood and adulthood periods particularly by giving the feeling of fullness to infant, and organizes the infant's energy metabolism (Gokcay & Garibagaoglu, 2002; Savino et al, 2009).

2.2.4 Scala of breastfeeding diagnosis

The researchers have developed various tools that measure the effective nursing behavior of the infant exactly and clearly, and they measured successful breastfeeding through the effectiveness of nursing and lactating behavior. Some of these tools are MBA (Mother Infant Assessment tool), IBFAT (Infant Breastfeeding Assessment Tool) and LATCH Breastfeeding diagnosis measurement (LATCH Assessment tool) (Jensen et al, 1994).

2.2.4.1 LATCH (LATCH assessment tool) breastfeeding diagnosis measurement tool

LATCH Breastfeeding diagnosis measurement tool is a tool that is developed in 1986 by assimilating to Apgar score system in terms of scoring method. The evaluation of LATCH Assessment Tool is fast and easy like Apgar score. The development purposes of this assessment tool are classified below:

- Being able to conduct the breastfeeding diagnosis objectively,
- Determining the breastfeeding problems and making the training plan,
- Creating a common language among the health care personnel,
- It is developed to be used in surveys (determining the breastfeeding achievement in longitudinal studies) (Hamelin & Mcleman, 2000; Jensen et al, 1994).

This assessment tool consists of five evaluation criteria. LATCH generates from the combination of first letters of these five criteria in English. These criteria are listed below:

- **L:** Latch on breast
- **A:** Audible swallowing
- **T:** Type of nipple
- **C:** Comfort breast/nipple
- **H:** Hold

Each term is evaluated between 0-2 points. The total is 10 points (Adams & Hewell, 1997; Hamelin & Mcleman, 2000).

The reliability of LATCH Breastfeeding diagnosis measurement tool is determined in America by means of the studies of Adams and Hewell in 1997. The concordance percentage between three breastfeeding consultants and researchers, and independent observers is found out 94.4%. The concordance percentage of each term between the observers changes between 85-100% (Adams & Hewell, 1997; Hamelin & Mcleman, 2000).

Evaluation criteria	0+	1	2
Latch on breast	It sleeps or reluctant; it cannot achieve to latch on the breast	It tries again, only latches on the nipple, nursing activity is observed.	It holds nipple by also latching on the areola, sucks rhythmically, its lips are extraverted.
Audible swallowing	No	Some nursing movements	Short term strong expirations are observed while swallowing.
Type of nipple	Dented	Smooth	Discharge through stimulation
Mother's Comfort regarding to breast and nipple	Blocking of duct; swelling, bleeding, bruise of breast	Reddish color, small bruises, decrease in comfort	Soft breasts and comfortable mother
Hold	Completely through assistance	Minimal assistance	Without assistance

Table 2. Evaluation of the effective breastfeeding (LATCH breastfeeding scale) (Yenal & Okumus, 2003).

2.2.5 Weaning

It is difficult to say when the infant should be weaned. Following the 6th month, which is an obligation to breastfeed, the mother may last this period by adding nutritional supplements up to the 1st year. Children breastfed for longer terms tend to abandon nutritional supplements and prefer breast milk.

Some principles in weaning:

- Weaning is never carried out suddenly. It is most appropriate to start weaning by reducing meals and waiting for child to adapt nutritional supplements.
- If the infant is ill, weaning is not made.
- Weaning should not be tried in hot seasons unless there is a significant reason.
- Weaning before the 4th month carries risks to the life of the infants (Arcasoy et al, 1994).

2.2.6 Artificial nutrition

The role of the breast milk in infant's nutrition is no contestable. The most important duty of health care personnel should be not to deprive the infant of this irreplaceable natural nutrient and to do the necessary. However in case of the existence of some health problems stated before, the mother cannot feed her infant with her milk (Ozalp, 1996).

The terms to consider in artificial nutrition are:

- Choosing the substitute nutrient for breast milk,
- Informing mother about how to prepare the nutrient and its amount to give the infant,
- Teaching the requirements to prepare it in a hygienic manner,
- Observing the growth and development of the infant (Ozalp, 1996).

Name of the Assessment Tool	Focused Point or Person	Evaluator	Criteria Used in the Assessment
LATCH	Mother and infant	Mother or nurse	Latch on breast Audible swallowing Type of nipple Comfort breast/nipple Hold
IBFAT (Infant Breastfeeding Assessment Tool)	Infant	Mother or nurse	Readiness to feed Rooting Fixing (latching on); Sucking
MBA (Mother Infant Assessment Tool)	Mother and infant	Nurse	Signaling Position Fixing Milk transfer Ending
SAIB (Systematic Assessment of the Infant at the Breast)	Infant	Mother or nurse	Alignment Areolar grasp Areolar compression Audible swallowing
BAPT (Breastfeeding Attrition Prediction Tool)	Information of mother and her manner about breastfeeding shows the risk of giving up breastfeeding early	Mother	Manner Subjective norm Control
H&H Lactation Scale	Mother and infant	Nurse	Insufficient milk supply (Has 3 subscales) Saturation and confidence of mother Satisfaction of child Adequacy of mother-infant breastfeeding
Evaluation Scale of Breastfeeding Manner	Mother	Nurse	Mother's own manner about breastfeeding Mother's manner about breastfeeding related to other people (husband, family and immediate vicinity, health care personnel) Society's manner about breastfeeding as a function special to woman
MBFES (The Maternal)	Mother and infant	Nurse	Satisfaction of mother /Gaining the role of maternity

Name of the Assessment Tool	Focused Point or Person	Evaluator	Criteria Used in the Assessment
Breastfeeding Evaluation Scale)			Infant's capacity/ development Life style /body image
Breastfeeding Observation Form (WHO/UNICEF)	Mother and infant	Nurse	Body position Infant's behavior Emotional commitment Anatomy Sucking Spent time for sucking

Table 3. Various breastfeeding assessment tools and their properties (Hamelin & Mcleman, 2000).

Artificial nutrition can be applied through industrial formulas or cow's milk which has modified content.

When the socio-economic conditions of the family are suitable, industrial formulas should be preferred especially in early months.

According to their features, industrial formulas can be classified in three groups which are adapted, semi-adapted and follow-on-formulas (Ozalp, 1996).

Adapted Milk Formulas: This milk is in the form of liquid and powder. It is made from cow's milk and shows compliance with the composition of breast milk. Protein and minerals (Na, K, Cl, Ca, P) of cow's milk are reduced, their fats are modified and enriched with the vegetable oil supplement. Fat contents supply half of the total energy and they have rich content in terms of essential fatty acid-linoleic acid. Amylase enzyme is physiologically low. As the infant grows up, it begins to secrete the amylase enzyme in normal amounts. Adapted formulas do not contain starch in accord with the physiological growth of the infant. Their carbohydrate contents include the invert sugar-lactose in breast milk. The ratios and osmolarities of whey protein/casein, protein/ carbohydrate are made familiar to breast milk. Also vitamin D and some other vitamins are added and some of them contain nucleoproteins, carnitine, taurine and additional iron. It is recommended for the infant to be fed with the adapted formulas in neonatal period and in the first months of life (Ozalp, 1996).

Semi-adapted Formulas: Protein content and energy densities of these formulas are higher. Their complex carbohydrate structures that are comprised of lactose and corn syrup essence accustom the infant to nutrition. With respect to their contents, they also show some of the characteristics of the adapted formulas. Similarly, the osmolality of the semi-adapted formulas are made similar to the breast milk. When they are given in proper amounts, they are adequate for the infant's nutrition up to 4th-6th month (Ozalp, 1996).

Follow-on-Formulas: These are the industrial formulas having the content to meet or support the infant's needs after the month 4-6. They are recommended for the infants that are breastfed after the month 4-6 (Ozalp, 1996).

2.2.6.1 Artificial nutrition technique

Before starting any usage of formula, the information about financial aspects of this decision must be given to mothers. Tolerating selected formula by infant and ease of preparing are

the essential criteria for deciding on which type of formula will be selected (Arcasoy et al, 1994; Turkish Republic Ministry of Health AÇS/AP General Directorate, 1997).

Readymade formulas contain enough calories for newborn when it's diluted with warmed water in a recommended way. There exist some formulas that are prepared for the infants that are allergenic to cow's milk and must have a special diet (Cavusoglu, 2000).

Formulas with prebiotics are of a big advantage to the infants. Especially during the lack of mother milk these formulas with the closest probiotic and prebiotic to the mother milk should be given. In asthma and atopic dermatitis, there are also numerous benefits if given to infants. In addition, there are studies about which the probiotics prevent allergic diseases (Pehlivanoglu, 2007).

Formulas are prepared for a time period of 24 hours and are kept in the fridge. If they are not used in this term, they must be thrown away. The opened powder-type formulas can be maintained in the fridge for 4 weeks. After this period, the remaining part should be disposed.

To prevent the contamination by pathogenic microorganisms, great caution is given to the sanitation rules during the preparation of infant's formula. The chance of contamination is relatively low if the mother boils chlorinated water and makes use of hygiene techniques. Before its use, the feeding-bottle is kept for 25 minutes in boiling water for the sterilization purpose.

An hour before the nutrition, the bottle is taken out of the fridge and kept at the room temperature. Although some parents chose to heat the feeding-bottle for 20 seconds in microwave oven, this is often considered to be risky. The milk at the middle of the heated bottle will be hotter than the milk on the sides. To prevent the infants' tongue getting burnt, parents may shake the bottle and test the milk (temperature) on their wrists.

Alternatively, the feeding-bottle can be heated by placing it inside of a larger container which is filled with water. In any case, parents are strongly advised to check the temperature of milk before using the formula.

During nutrition the infant is taken onto lap holding its head a little high above so that the aspiration risk can be reduced. To prevent infant to swallow air instead of formula, it is important to check if the nipple is filled with milk. Since the infants are particularly subject to accumulation of gas in their stomach during feeding, the infant should be burped after nutrition (Çavuşoğlu, 2000).

Infants that are nourished with feeding-bottle or spoon are generally held at the horizontal position. Connected with the negative pressure occurring at the rear pharynx during nursing, otitis media is observed more often in the infants who are nourished with feeding-bottle. Otitis media is rarely observed in infants who are nourished with breast milk because they are not held at that position.

Although the infants who are nourished with formula put on more weight than those who were breastfed, such growth is no natural (Yurdakök, 1991).

It was observed that mothers had a tendency of preparing condense formulas believing this way would be more nutritious for their infants. However, if the industrial formulas are not

watered down with sufficient cow's milk, the osmolar burden at kidneys significantly increases. In this case, the infant dehydrates more while attempting to rid the solid load at the urine. To make the things worse, the infant's crying at this time might be (mis)interpreted as the sign of hunger, not thirst! Loading infant with the same regimen might result in a negative water-balance for infants to develop, not to mention the risk of obesity due to the excessive food intake.

Fever of the infants fed with hyperosmolar nutrients goes up. Depending on the oral solid load diarrhea may follow. Abdominal distension and vomiting can also happen. The infant is seen disturbed at these times. Such findings in relation to feeding infants with concentrated formulas are often considered as "gastroenteritis" caused by infection.

At inadequate socio-economic conditions, the tendency of mothers on giving diluted infant formula was also observed. Affecting the growth of infant, it may result in other health problems should the infant also have malnutrition (Özalp, 1996).

According to a study by Egemen et al (1997) in which the formulas given in Izmir were determined if they had been prepared watery or not, it was found that 80% of the mothers prepared infant formulas either too less or too much watery, and the 50% prepared with different amounts of water at two separate meals (Egemen et al, 1997).

Mothers should be well-educated on preparing formulas, and if possible, having the formulas prepared demonstratively at home is needed (Egemen et al, 1997; Özalp, 1996)

The Amount of Milk to be given during Artificial Nourishment: By calculating the calorie and protein of nourishment, it is prepared according to the required amount that would be given.

If there is no chance of giving breast milk to a newborn -8 or 10 hours after the birth, this type of nourishment is started as 8 meals a day, and to give 10 ml of milk each time. By the seventh day, it is increased by 60 - 70 ml a day. After the seventh day, 60 - 70 ml a week is added until the end of the first month. The milk to be given is an adapted version of genuine breast milk; the watering of milk can be increased to 8%, 10%, or even 12%. These amounts at meals are not constant. Sometimes the infant can take more or less of it. While seven meals are generally enough, 8 meals can be given to those who get tired easily or who were born with low weight.

A normal infant sleeps if it is full, wakes up when it is hungry. Although it cannot find rhythm following the first few days after delivery, it starts focusing its requisitions on the daytime. It's suggested to prepare a infant bottle of 110-120 ml, and to let the infant start nursing as much as it wants. The remaining milk in the bottle is measured, afterwards. By checking for 2-3 days, whether the infants take a proper ration is examined. The period between two meals shouldn't be less than 2 hours. The infant becomes full after 7 meals at first, and with 6 meals, later on. Night infant bottle is at the end of the first month in general.

Some infants never have regular nutrition. After 15 or 20 days of trying, a strict behavior should be preferred after 15-20 days. 7 glasses at the first, 6 of which should be given between 07-22, and the seventh should be given at night; 6 infant bottles at the 2nd month. The sleeping infant must not be woken up for nutrition after the first month.

Weekly weight controls should be done, and the rations of the infants who didn't put on weight should be gently increased. Some children require more than enough nutrition even

though they grow well. Therefore, Adding water rather than increasing the ration would be of a better course of action (Arcasoy et al, 1994; Çavuşoğlu, 2000).

2.2.6.2 Nutrition with cow's milk

It is necessary to give milk with making watery at first months of life in which cow's milk, especially lots of enzymatic functions and kidneys are immature. Basically, in first 4 months, feeding the infant with industrial milks called adapted milk whose composition is liken to breast milk is truer. But in truly necessary cases, children of the families with bad economic condition cannot drink breast milk either; hence, nutrition with cow's milk partially or completely starts. Cow's milk is not appropriate nourishment for the first months of life (Arcasoy et al, 1994).

Composition	Breast milk	Cow's milk
Calcium mg/dl	34.0	120.0
Phosphorus mg/dl	15.0	95.0
Iron mg/dl	0.5	0.5
Iodine UG/L	30.0- 70.0	47.0
Flour UG/L	5.0- 50.0	70.0- 220.0
A vitamin IU/L	1988.0	1025.0
C vitamin IU/L	43.0	11.0
D vitamin IU/L	22.0	14.0
K vitamin IU/L	16.0	60.0

Table 4. Ingredients of Breast Milk and Cow's milk (Kliegman & Marcadante, 2008)

If giving cow's milk is necessary, milk is made watery with boiled water. Between 1st and 4th months, it's prepared as 2 parts water 1 part milk, between 4th and 5th months, there are 2parts milk 1part water. For the children above 6 months, it's unnecessary to make cow's milk watery (Arcasoy et al, 1994; Baysal, 1993; Çavuşoğlu, 2000).

Cow's milk is sweetened on the purpose of preventing constipation and increasing energy with 5%rate of sucrose, which means sugar used at home; because of the fact that cow's milk lactose is less than breast milk. It must be defined to mothers as one tea spoon granulated sugar for 100 cc milk (Arcasoy et al, 1994).

2.2.7 Starting additional supplements for infants

As of the month 4 - 6 breast milk becomes deficient in satisfying some of the infant's needs. Additional supplements are added slowly to start the transition from newborn breastfeeding to adult feeding. All nutrients given to infant except the breast milk are called additional supplement. They provide energy, protein, fat and other nutrient elements. This early period is called the period of starting additional supplements or "*weaning period*" (Bertan & Özcebe, 1995; Tokatli, 1996). The word weaning comes from the Anglo-Saxon word "*wenian*" which means getting used to something new (Coşkun, 1991). Weaning is a period in which breastfeeding continues for another year while additional supplements are being served in an appropriate fashion (Bertan & Özcebe, 1995; Tokatli, 1996).

Considering that breast milk can still be enough for an infant during the months 4-6, additional supplements may start at any time in this period. The deviations in the growth

curve are often the best indicators showing that there is a need for additional supplements. The time of starting, therefore, can be determined by observing the infant's growth (Bertan & Özcebe, 1995; Coşkun, 1991).

In fact, the level of growth for the infant's gastrointestinal and metabolic functions determine this time. Neurological and psychosocial developments have also their share in that determination.

The completion of head-neck control, the development of hand-eye coordination, starting to interact with mother and the surroundings, starting to sit, the development of mastication-swallowing coordination are of the required steps for an infant to start additional supplements. Neurological and psychosocial developments within this period also enable additional supplements for an infant in 4-6 months (Tokatlı, 1996).

Since weaning is an orientation term for infants, whether or not the infant is ready should be considered. For instance, starting to additional supplements may be postponed for a while when the infant grows teeth, has fewer, or is sick (Coskun, 1991).

There are complications and inconveniences regarding whether the infant starts additional supplements too early, or too late (Bertan & Özcebe, 1995; Taskin, 1997).

Early Starting to Additional Supplements (Before the month four)

- The given supplements may be contaminated (even in small amounts) which increases the risk of infection in infants.
- Early supplements cause too much solute load-up for the kidneys, hyperosmolarity and dehydration become imminent.
- Due to the diminishing demand for breast milk, the breastfeeding rate drops and milk production decreases; eventually this affects the growth rate.
- Malnutrition.
- May reveal allergic reactions.
- Increases the obesity risk for the coming ages.
- Coeliac disease emerges at younger ages (Bertan & Özcebe, 1995; Tokatlı, 1996).

Late Starting to Additional Supplements (After the month six):

- May lead to growth retardation due to having food less than what infant needs.
- May lead to diarrhea, other infectious diseases, and decrease in immunity.
- May lead to nutritional deficiency and related illnesses, such as iron deficiency anemia and malnutrition.
- Micronutrient deficiency may develop.

The 4th and 6th months are the terms when infant learns mastication. If the ability is not gained, this may lead to significant nutrition problems in the future (Bertan & Özcebe, 1995; Tokatlı, 1996).

Breast milk cannot satisfy the calcium needs of infant after 4th or 6th months. That's why yoghurt is given as the first additional supplement with breast milk. Secondly; breast milk cannot satisfy the needs of C vitamin and carotene and fruit, vegetable juices and after purees of these foods are given as additional supplements. Thirdly; breast milk and additional supplements cannot satisfy the needs of B vitamin and energy. For being able to

provide these, floury foods, vegetable soups with flour and especially tarhana soup is given. Fourthly, breast milk and additional supplements cannot satisfy the iron need of infant and nonfat ground meat, meat or lentil is added to infant's soup. After adding meat, egg also takes place in the infant's nutrition (Bertan & Guler, 1995).

In selecting the additional supplement will be given, some features like the needs of infant, motor and mental improvements, capacity of GIS digestion and absorption, kidneys' capacity, sensibility to allergens must be considered (Taşkın, 1997).

The most allergenic foods: Sugared foods with additives inside, chocolate, egg, milk, peanut, walnut, horse-bean, green peas, lentil, game animals, various fishes, shellfishes, wheat, corn, rye, chees, brewer's yeast, melon, water-melon, strawberry, fig, tomato, grapefruit, etc.

Gluten enteropathy (coeliac disease - CD): What is recommended today is to give the mother-milk ideally long, and to start supplementary nutrition containing gluten between the months 4-7. As a protective measure for infants against meeting early with the gluten rice can be a good substitute (and a fine starter of cereals) since it is already a part of the traditional infant nutrition. Even there could be genetic susceptibility it depends on the nutrition habits of societies and individuals, to the qualitative and quantitative characteristics of the gluten taken, and whether the clinical symptoms were distributed on a large spectrum. Unless there is gluten in the diet CD does not develop, which is why countries like Japan and China are the best examples to it for their traditional nutrition habits (Demirceken, 2011).

Feeding the infants with formulas lacking iron (formulas with rice flour) and starting to cow's milk (in larger quantities than half a liter) before age 1 is a major reason for iron deficiency anemia to develop. The iron in mother milk, however, is absorbed better than that in cow's milk. To overcome this matter, additional iron supplements in small amounts (such as 1-2 mg/kg) as of the 2nd month are recommended to the mothers who have delivered their premature newborns with a low birth infant weight; as to those who had in-term deliveries the supplement is suggested after the 4th month. In general mother milk should be given for the first 6 months, while formulas rich in the iron should be supplied until the age 1.

Nutrition habits with ready convenience foods, insufficient food intake in the name of diet, vegetarianism, bad socio-economic conditions all contribute to iron deficiency anemia, especially for the elder children.

It was observed that the nutrition habits even at our rural areas are changing; for instance, our traditional nutrient-rich foods "*tarhana soup*" and "*bulgur*" (rice in the form of cracked wheat cooked with tomatoes) were being replaced by fried potatoes in all three meals, in which case, the iron intake through potatoes would be very inadequate and, thus, iron deficiency anemia has increased in recent years in our country (Cetin, 2011).

2.2.7.1 Subjects to take into consideration when starting additional supplements

- Socio-economic and cultural conditions of parents, relations with the infant must be considered.
- If it's not needed, not been started to additional supplements before 3rd after 6th month.

- When the infant is 6-month-old, energy comes from the additional supplements mustn't exceed 50% of the total energy.
- Every additional supplement must be started to give alone and must be followed whether the infant tolerates or not. Do not start more than one additional supplement for the infant in a week.
- Additional supplements will be given are started at most 1 or 2 dessert spoons and must be increased as the infant tolerates.
- While preparing the additional supplements, pay attention to hygienic measures. Before preparing the foods and feed the infant, hands must certainly be cleaned.
- All nutrients must be tried by spoon.
- Infant may not eat some new nourishment. In this case, do not insist and try it again soon after.
- New nourishments must be tried while the infant is hunger and foods must clean and be pureed, ragged puree must be given as the infant is getting used to eat (Bertan & Güler, 1995; Coşkun, 1991; Tokatlı, 1996).

2.2.8 Mixed nutrition

It means giving other milks or milky nourishments to the infant who drinks breast milk. Major indication for mixed nutrition is lagging in weight gain of infant that is nourished with breast milk and has not any health problem and not recovering in spite of measures taken. This condition can only be determined by weekly or frequent measuring. For being able to reach this decision, the infant must be followed for 1 or 2 weeks (Kliegman & Marcadante, 2008).

Mixed nutrition is started as one meal a day. Meals that contain the least breast milk is evening times. For this reason, in the meal at 18:00-19:00 pm milk recipe or cow's milk prepared appropriately is given by spoon with the intended amount of infant after nursing for 5 or 10 minutes. If it's not enough, mixed nutrition is applied in two or more meals. In the infants facing with mixed nutrition, fruit juice is given after 4 weeks and pudding is given after 4 months (Kliegman & Marcadante, 2008).

2.2.9 Nutrition program of nursling at different months

0-6TH Months

For the first 6 months, only breast milk (Köksal, 2007). Breast milk must be given at every infant crying in first days, afterwards it must be given at every 2 or 4 hours if infant wants (Baysal & Arslan, 1997; Turkish Republic Ministry of Health AÇS/AP General Directorate, 1991; Turkish Republic Ministry of Fundamental Health General Directorate of Health Services, 1997). The growth by month of infant must be followed (Köksal, 2007).

6TH Months

4 or 5 meals Breast Milk + Every Second Days 1 Egg Yolk+ 1 meal Yoghurt+1 meal Fruit Puree /+1 meal Vegetable Puree (Baysal & Arslan, 1997; Köksal, 2007; Turkish Republic Ministry of Health AÇS/AP General Directorate, 1991; Turkish Republic Ministry of Fundamental Health General Directorate of Health Services, 1997). Pudding without sugar can also be given (milk + rice flour). Cow's milk can be used a little for preparing nourishments (Köksal, 2007).

7-9Th months

7th Month: Continue to breast milk, yoghurt, fruit juice, vegetable juice, grape molasses, rice flour, rice, egg yolk (all), meat (fish, chicken meats and red meat), vegetal oils, vegetable puree or vegetable soup (Köksal, 2007).

8th Month: Continue to breast milk, yoghurt, fruit juice, vegetable juice, grape molasses, meat (fish, chicken meats and red meat), lamb liver or chicken liver, vegetal oils, well mashed home meals (with ground meat and vegetable), all egg or pasteurize cheese, cereal - red lentil, haricot bean, chickpea purees (Köksal, 2007).

Sample Menu:

At Morning 8 am: Breast Milk, One or Two Biscuits, + One Egg Yolk or White Cheese sized with Matchbox.

At 10 am: Fruit Puree+ A Biscuit

At 13 pm: Vegetable Soup with Meat or Puree (Farci and Similar Home-made Vegetable Meals).

At 16 pm: Breast Milk or Yoghurt (With little sugar or Plain).

At 20 pm: Breast Milk. 150 ml milk or Pudding (for the infants having meal four-times-a-day, fruit puree is given after the vegetable soup at 13 pm). If needed, Breast Milk at night (Baysal & Arslan, 1997; Turkish Republic Ministry of Health AÇS/AP General Directorate, 1991; Turkish Republic Ministry of Fundamental Health General Directorate of Health Services, 1997).

10-11Th months*Sample Menu:*

Morning At 8 am: Breast Milk, Honey or Grape Molasses + One All Egg (Instead of every second days White Cheese) + A Thin Slice of Bread+ One Tea Spoon of Butter.

At 12 am: Vegetable Puree + Two Dessert Spoons of Wiggged Liver Pate Mixed to the Vegetable Puree, Chicken or Meatloaf. Instead of vegetable puree normal homemade mashed food is given Pieces of food must be given. If there isn't any bread taken in the morning, it is given in this meal.

At 16 pm: 150-200 gram Pudding or Fruit Puree with Yoghurt

At 20 pm: Pudding or Yoghurt (1 or 2 Spoons Pastry; For Instance it can be mixed with macaroni). + 2 or 3 Soup Spoons of Vegetable Puree. Milk can be given to the infant that doesn't eat yoghurt (Baysal & Arslan, 1997; Turkish Republic Ministry of Health AÇS/AP General Directorate, 1991; Turkish Republic Ministry of Fundamental Health General Directorate of Health Services, 1997).

12Th months

12th Month: Continue to breast milk, yoghurt, fruit or fresh-squeezed fruit juice, vegetable juice, grape molasses, egg (all) or pasteurize cheese (Köksal, 2007).

Sample Menu:

Morning, 150 ml Milk + 30 Gram White Cheese or Egg + 1 or 2 Biscuit or A Thin Slice of Bread + A Dessert Spoon of Jam, Honey or Grape Molasses.

Midday, Vegetable Meals with Meat at home or Vegetable Puree, If there is not, A meatloaf + Macaroni or Fruit Puree.

Midday-Afternoon, 150 ml. Cow's milk or Yoghurt or Rice Pudding + Two Biscuits.

Evening, 2 or 3 Soup Spoon of Vegetable Puree+ Mashed Macaroni or Rice+ Yoghurt (or other soups or vegetable meals prepared for family members) (Baysal & Arslan, 1997; Turkish Republic Ministry of Health AÇS/AP General Directorate, 1991; Turkish Republic Ministry of Fundamental Health General Directorate of Health Services, 1997).

2.3 Nutrition of game child

In order to avoid occult gastrointestinal bleeding, cow's milk should not be given until the age of 1. It is essential to avoid excessive milk consumption (>24 oz/day, 1 oz=30 ml) among game children (age of 1-3) because doing so causes decrease in the solid and nutrient-rich intake, which later results in overweighting. Fruit-juice consumption should be limited to 4-6 oz/day for those and younger children, while it should be 8-10 oz/day for the elder ones (up to the age of 18). Infants should be present at the dinner table as soon as they are 1-year-old, so they could start having regular meal. They should have a refreshments list, and they should be encouraged to eat food by themselves, especially the foods which are edible by use of their hands. Generally, the required amount of food is satisfied by filling up one spoon from every nutriment in every meal; more can be supplied should the infant require or demand otherwise (Kliegman & Marcadante, 2008).

In spite of having one or two meals a day some children may have all the energy they needed. The required energy of a game child is 80-90 kcal /kg/day, and the important point here is that a regular nutritional habit should be gained (Tunçdoğan & Tunçdoğan, 2005; Weisstaub et al, 2003).

The Food Groups to be Present in their Menu:

In the first group: Meat, chicken, fish, egg, legume, etc. This group has high quality of protein for

- Strengthen of Muscles
- Blood-forming
- Healthy growth and healthy life (2 or 3 portions a day).

In the second group: Milk, yoghurt, cheese, and so forth belong to here. Besides high quality of protein, there are

- Enough CA
- Vitamin A and
- Vitamin B for bone and teeth development.

400-500 ml. milk or yoghurt, and cheese in the size of a match-box should be consumed in a day.

In the third group: There are cereals, vegetal proteins and Vitamin B. It is needed to take three or four portions a day from this group.

In the fourth group: Vegetables, Fruits, and the Vitamins A-B-C. Three or four portions should be taken every day.

In the fifth group: Sugars and Fats: foods made of sugar or rich in saccharides, grape molasses, honey, jam, butter, olive oil and other vegetal oils, fatty foods, all of these provide huge energy (Kliegman & Marcadante, 2008; Tuncdogan & Tuncdogan, 2005).

2.4 Nutrition of school child

While nutrition during the term -sometimes called- nursing infancy (roughly the age of 0-1) is the determining factor of growth and development, it gains more importance for the aging children with respect to learning or developing nutritional habits and the prevention of future health-problems. Especially during the school childhood, making the habit of regular age-appropriate physical activities is also essential next to the nutrition in order to maintain a healthy life in the adulthood. Parents who send their children to the school may readily feel comfortable about the nutrition times of their children. The fact is, however, children at school need family supervision as much as before. Of the areas parental control has a crucial role are the child's ability to choose nourishments, the likelihood of becoming influenced by friends, and their tendency of skipping meals (Süoğlu et al, 1999).

School children are still at the growing period. Growth requirements are determined by the physical activities, genetic features, and body structures, which all affect the overall nutritional needs. While the qualitative characteristics of the required nutrition for this age group are the same as adults, the required amounts differ significantly. Appetite increases especially during rapid growth periods; likewise, if the growth slows down the nutrient amount that is taken decreases. Carbohydrates and fats provide energy for growth and physical activities. Proteins which form and repair the body tissues are essential for healthy growth. It is strongly recommended that every school children should consume foods rich in protein, such as meat, fish, or poultry 2-3 portions a day in addition to milk and dairy products, which are also good sources of protein (Tunçdoğan & Tunçdoğan, 2005).

Although there is enough calcium in milk and dairy products, or the dark green vegetables to satisfy the daily requirements of young children, the need for increasing amounts at the adolescence cannot be satisfied. Iron requirements increase with the increase in blood volume during this period. With the start of menstruation girls should compensate their iron loss. Among the best sources of iron are meat, fish, barnyard fowl, and bread and cereals which are prepared rich in iron (AAP, 2003).

In most of the developing countries, insufficient nutrition and inability to provide additional supplements at the weaning period lead to malnutrition and short stature as an outstanding health problem. On the other hand, obesity, hypercholesterolemia, atherosclerosis and type-II diabetes risk are major concerns in developed countries caused by the same problem. (Jinabhai, 2003; Weisstaub et al, 2003). This situation draws attention to the nutrition types present at schools, and leads to studies about exercise habits and ways of correcting. The fatty ingredients of the food offered in schools, school canteens and mass-rooms with high saturated fat rate, appears to be a serious risk factor (Lytle et al, 2002; Stitzel, 2004).

One other problem related to the malnutrition of school children is skipping of breakfast (Lytle et al, 2002; Stitzel, 2004).

Analyzing the data in nurseries in our country, vitamin and mineral deficiencies were revealed to be high, where, in particular, zinc deficiency, which affects the growth adversely, was notable (Süoğlu, 1999; Yaşar, 1999). Among the Turkish children, skipping meal is a major problem for students who are going to state schools, while disliking meals and consuming poor foods are so for the private school students (Yaşar, 1999). Obesity, anemia, and tooth decay are also observed among the Turkish children.

Sample menu for school children between 6 and 10:

Breakfast:	A water glass of milk or fresh fruit juice An egg or cheese sized as a match box 2 dessert spoons of honey or jam or hazelnut paste 5 or 6 pieces of olive 2 thin slices of bread
Mid-Morning:	A medium sized fruit
Midday:	7 or 8 table spoons of meat pasty 3 or 4 table spoons of vegetables with olive oil A thin slice of bread (if a slice eaten at breakfast)
Mid-Afternoon:	A bowl of ice-cream
Evening:	A bowl of lentil soup A bowl of chicken with vegetables A thin slice of bread
Postprandial:	10 or 12 pieces of nut, hickory nut A medium sized fruit

2.5 Nutrition of adolescent

Adolescence can be a term in which unhealthy nutrition habits are earned. Skipping meals (especially breakfast), excessive eating, getting on a diet, consuming poor or food with high calories are so common. Consuming excessive sugar because of some drinks like soda water fruit juices, coffees and teas can cause excessive increases in weight and tooth decay. Also these drinks replace with the foods necessary for body. Inadequate calcium taken at his term can trigger osteoporotic hip fractures in adult term. Diet poor in calcium, inadequate calcium taken or osteopenia improved after calcium absorption destructions, is seen in child and adolescent more often and treated (UNICEF, 1994).

It is the parents who usually consult to the healthcare staff in eating disorders. These disorders are *anorexia nervosa* (significant weight-loss due to causing to vomit deliberately) and *bulimia nervosa* (stable weight by deliberate vomiting despite excessive eating). Prolonged diarrhea, repeating vomits, weight-loss, and inexplicable physical discomfort like amenorrhea are among the symptoms that will expose these illnesses. Adolescents who cause these symptoms deliberately are overly-concerned with their physical shapes; they keep their intents secret -along with the symptoms- for a long time. Among the ways serving that goal are putting on loose-fitting dresses, starting excessive physical trainings,

picking up low-calorie and low-fat foods, complaining from some allergy resulting from tasting or smelling the foods, and dumping off what they got sneakily (either through vomiting or intentional diarrhea). Determining the risk of death due to the disguising frequency is a diagnostic difficulty (Swift & Johnston, 2007).

Food Group	Nutritional Value	Required Daily Portion
Breads, cereals Other grainy goods (whole grain, enriched)	Carbohydrate, thiamine, niacin and rich than iron	At least 6 portions (1 portion: 1 thin slice of bread, 3 or 4 small or 2 big crackers, 30 g ready cereal for breakfast)
Fruits (Citrus, melon, strawberry and others)	Carbohydrate, A & C Vitamins	At least 2 portions (1 portion: middle sized apple, banana or mandarin, a half grapefruit, a slice of melon, a half bowl of strawberry, ¼ bowl of dried fruits)
Vegetables (dark green-leafy vegetables, legume, pea, other vegetables which contains high amylum)	Carbohydrate, A and C vitamins (different types must be consumed a few times a week)	At least 3 portions (1 portion: a half bowl of cooked vegetables, a half bowl of fresh-cut uncooked vegetables, a bowl of leafy uncooked vegetable like spinach)
Meat, barnyard fowl, fish and equivalents (egg, legume, crusty nutshells)	Protein, thiamine, niacin, iron	2 or 3 portions (Total daily intake 150-200 g lean meat, must be same as barnyard fowl or fish; 1 egg, a half bowl of cooked legume or 2 table spoons of peanut butter that is equal to 30 g meat)
Milk, cheese, yoghurt	Protein, Calcium, Riboflavin	2 portions (for adolescences, 3 portions) (1 portion: 1 bowl of milk, 250 cc yoghurt, 45g natural cheese, 60 g processed cheese)
Butter & desserts	Energy	The incomplete energy requirements following the consumption of the amounts from other nutrition groups

Table 5. Healthy Food Alternatives for School Children (Yaşar, 1999)

Sample menu for girls at adolescence:

Breakfast:	A water glass of milk or fresh fruit juice An egg or cheese sized as match box A table spoon of honey or jam pr hazelnut paste 5 or 6 pieced of olive 3 thin slices of bread Few slices of tomatoes or orange (for milk drinkers)
Midday:	2 pieces of grilled meatballs (cold cuts vegetable) 3 or 4 table spoons of borlotti beans in olive oil A bowl of milk puddings 1 or 2 thin sliced of bread
Mid-afternoon:	4 or 5 table spoons of burghul salad A water glass of ayran
Evening:	A portion meat and vegetable stew 4 or 5 table spoons of macaroni
After the meal	A medium sized fruit 10 or 12 pieces of nut or hickory nut, 2 or 3 pieces of dried apricots or fig

Sample menu for boys at adolescence:

Breakfast	A water glass of milk Cheese sized as 1 or 2 match boxes 1 or 2 table spoons of honey or jam or hazelnut paste 6 or 7 pieces of olive 4 or 5 thin slices of bread Few slices of tomatoes or orange
Midday:	7 or 8 table spoons of vegetable meal with meat 3 medium slices of pastry with potatoes 1 or 2 water glasses of ayran
Mid-afternoon	A toast with yellow cheese A water glass of fruit juice or 1 medium sized boiled corn, a tin of ayran
Evening:	1 or 2 bowls of tarhana soup Grilled fish sized as 2 meatloaves, salad Tahina halva sized as 2 match boxes
After the meal:	1 or 2 medium sized fruits 1 water glass of milk

2.6 Obesity

Obesity is a medical condition and an illness in which excess body fat has accumulated to such extent that it may give rise to various other illnesses, and lead to reduced life expectancy, besides an apparent deformation very notable at the first glance. Observations and statistics indicate a gradual increase in obesity among children and adolescents. The concern here is that while obesity adversely affects mental and physical health of the individual, it also brings economic burden to the society (Arslanoğlu, 2009).

Pathology -- constitutes a significant portion in the increase of adiposity mass among the normal-weight infants. The total adiposity number gradually increases between the month 6 and age 2, and stays stable until the ages of 8 and 10. Associated with puberty, a leap may occur in this number and in the height. In obese children, the fat cells are larger and more in comparison with those who have normal weight (Tereshakovec, & Stallings, 1996).

Epidemiology -- despite the familial tendencies toward obesity, the key point here is how much the genetic and environmental factors contribute to these tendencies. Comparing the twins adopted together, the 80% of the changes in weight/height or skin thickness can be explained on genetic basis (Tereshakovec, & Stallings, 1996).

The obesity at mother is founded related with increase in adipose tissue at newborn. The children of one or two of obese parents are inclined of being obese in adulthood. (If one of the parents is obese, the risk is nearly 40%; if both of them are obese the risk is 80%) In the first year of life, there is a moderate correlation between putting on excessive weight or the rate of being obese and getting obese later. But infants with excessive weights do not be obese child. Most of obese babies and children do not be obese adults. The risk of being obese that continues in adulthood, increases with the increase in the starting age for obesity (adolescence across infanthood) and severity of obesity (If the ideal body is more at its 180%, the possibility of being obese in adulthood is 100%)(Tereshakovec, & Stallings, 1996).

Obesity diagnosis which is age-adjusted is putted with determining ideal percentage deviations at weight of the body according to height. The real weight more than 120% of ideal weight, accepted as obese. But weight deviations related with height can cause defining as wrongly obese of a muscular person. For this reason, measurement of triceps skin thickness by compasses is more certain, useful method at evaluating adiposity; values above 85% at improvement curve are accepted in favor of obesity. (Tereshakovec, & Stallings, 1996).

The main problems must be solved of a child determined as obesity; whether being a syndromic or endocrine reason of this issue or not, if there is an external (exogenous) obesity, being expected complications for the moment whether or not or in which the risk is more, if there is no complications, in which conditions the external obesity improves and determining the ones that can be changeable and making appropriate suggestions (Arslanoğlu, 2009).

Being useful of protection, increasing exercise and reducing fat intake, there is no protection method defined. Although energy taking /brim weight is stable, there exist big differences in rate of fat accumulation among normal children. For this reason, it can be difficult to determine the appropriate calorie level for any children. Dietary recommendations accepted as more than a fixed number of calories per kilogram of body weight must be made according to the speed of growth (Tereshakovec, & Stallings, 1996).

Beating with the obesity problem, carries two versatility as in the example of social-individual and preventing- nursing. For giving an example of societal preventions, in England at school canteens, being forbidden of food and beverages (with sugar) advertising on TV at the hours of children program published. Nutritional education for groups and physical activities can be an example of social therapeutic approach. Individual preventing approach is as arranging nutrition at pregnancy, being fed with breast milk, planning nutrition habits will be earned later, educating for defected behavior of the child within an obese family or group of friends. Individual therapeutic approach is being followed of obesity child by appropriate nutritionist (Arslanoğlu, 2009).

2.7 Nutritional education

A good nutrition is not only an important factor for the healthy development of individuals, families, and societies, but it helps us overcome the global issues like development of dietary levels of mother and infants, chronic diseases, mother deaths, malaria, AIDS, and other health concerns world is facing (Bellamy, 1998).

Nutritional education aims to gain society balanced nutritional habits by helping the individuals rid of incorrect and unfavorable practices. Such programs prevent nutrients from becoming health-risks, and teach the way of using food resources more efficiently. Nutritional teaching is an academic and practical concept regarding nutrition, dietetics, and nutrition science, including various scientific, economic and social aspects (Baysal, 1993).

The goal of nutritional education is to teach individuals how to use their foods in the best way with respect to the nutrition principles (Ozgur & Ozgur, 1994).

Most of the nutritional problems on national scale can be solved if the children are provided their food and bad nutritional habits are replaced by correct ones (Özgür & Özgür, 1994).

Nutritional education programs realize in two steps:

- a. Raising the personnel needed to carry out these programs
- b. Preparation of a program and its performance according to relevant analysis reports (Özgür & Özgür, 1994).

It is not necessary to include qualified nutritionists into these programs. As a matter of fact, these specialists are not in enough numbers at developing countries. Instead, those who have developed close relationships within the community should be placed. Of the good examples are nurses and midwives, health officials, the alumni of vocational high school for girls, and the primary school teachers. Should they have education on food production and consumption, by the help of the available specialists, such as agriculturalists, environmental health technicians, etc, they can be beneficial at the rural areas by aiming to educate teachers and the women of villages. Although our country has this potential our educating personnel should be made aware of this (Özgür & Özgür, 1994).

For instance giving up nursing early, is often based on the medical staff's apathy. If the nurses become conscious enough during their educations, nutritional education would be the main concerns. The programs of schools that train medical staff must aimed to think about this subject, seek solution ways, develop a creative talent (Özgür & Özgür, 1994).

Today, problems at nutrition area are; negativeness come from not being able to feed enough and balanced, deficiency of nourishment health applications, problems come with ignorance and inadequacies. Solutions will be brought for enough-balanced feeding and healthy nutrition problems must be handled together and a comprehensive point of view must be created (Perk, 1992).

These are the factors in the Assessment of Nutrition and Metabolism:

- The outlook
- model for food and liquid intake
- understanding of a balanced diet

- cultural and psychosocial factors affecting diet
- metabolic condition
- physiologic changes upon nutritional disorder
- Physical identifiers of malnutrition (Fuller & Schaller-Ayers, 1990).

In the study of Varol and Kocoglu (1997) with the purpose of examining education effect given to the mother, at growth and improvement conditions of low birth weight babies with following response group regularly and control group only 1st, 3rd, 6th, 9th and 12th months within the scope of education program, weight and height measurements are compared, improvement and starting months to additional supplement are evaluated. According to the study results, 90% of the babies in response group recover from malnutrition at 3rd month, this condition creates a statistically thoughtful difference between two groups ($p < 0.05$). Activity attributed to education at this month is found 24.2% in weights, 34.5% in height. 70% of babies in response group have been breastfed during 8 months and 1 year, 75-80% of them timely started to additional supplements (Varol & Koçoğlu, 1997).

2.8 The role of nurse at the infant nutrition

- Nutrition is the first duty a family has to learn. Parents are, therefore, given information about nutrition methods (breast-feeding or formula feeding).
- Mothers are assisted with knowledge and awareness in such a way that they give better nutrition to their infants.
- In prenatal term, the parental attitudes on breast-feeding and other nutrition methods are examined. Those who have interest in breastfeeding are shown breast anatomy and its physiology, and taught how to prepare breast tissue (Çavuşoğlu, 2000).
- The infant may be restless due to the need of touching her mom or because of hunger. The nurse teaches hunger symptoms to the parents (ex: uneasiness, crying, suckling gestures, activities in hand and mouth, tenseness and no sleeping, etc.) (Kilegman & Marcdante, 2008).
- Teaching how to feed and wind, more satisfying nutrition time is provided for both mother and infant.
- Mothers are taught about the importance of 'breast-milking-only' that is during the first six months.
- Starting to additional supplements which consists of purees and liquid foods following the sixth month is told to parents. Mothers are further informed about the ingredients of these supplements and their methods.
- For game children, the child can stay with the game and ignore nutrition. In this case, the child shouldn't be forced to have its meal no matter how resistant it can get against eating (Baysal, 2002).
- Monitoring of height and weight of the children is recommended in order to make a nutritional assessment.
- The nutrition and physical activity habits of the children should be arranged to maintain their nominal body-mass (Baysal, 2002; Turkish Republic Ministry of Health, 2004)
- If the infant or child has over-weight problem, the family and child should be encouraged for increased physical activities and directed to a dietician if necessary (Baysal, 2002).

- For school children, the families should be informed about how to overcome unwillingness about breakfasts, which might be related to having snacks at school or developing the habit of meal skipping. For this sense, the children should never be allowed to leave their home without having breakfast, and they should be supported with a lunch-box if necessary (Turkish Republic Ministry of Health, 2004).
- It is crucial for balanced and efficient nutrition not to skip a meal, and not a single breakfast. Besides with the three-times a day main meals, extra nutrient consumption should be encouraged in between them (Turkish Republic Ministry of Health, 2004)
- The weight-reducing diets in adolescence which are carried out incorrectly cause malnutrition and further health problems may arise afterwards. The family and child should be confronted, and directed to a dietician where necessary. If desire to lose weight is found to be overwhelming, a psychiatric intervention is therefore required (American Heart Association, 2006).

Nutrition of a child is very important with respect to its development; its nourishment should not be overlooked beginning from the infancy.

Upon the delivery, the pediatric nurse should support establishing the mother-and-child bond, support and monitor the early-term breastfeeding, support and encourage the breast-milk-only period, help mother and infant stay in the same room, and help mother be supported by the father and the entire family. Moreover, mothers should be given information about mother milk and lactation mechanisms, suckling methods, infant care, practical solutions to frequent problems, nipple care, mother's self-care, nutrition and exercise. Any missing points should be identified by observing the mother's breastfeeding and they should be assisted to make sure they become self-sufficient (İnce, 2001; Pilleteri, 1999; Yıldız, 2001).

Special diagnosis instruments can be used to help determine an objective breastfeeding plan in the shortest time (Hamelin & McLeman, 2000; Yenal & Okumuş, 2003).

Regarding the prevention of emerging problems, nurses should play a very active role as instructors and advisors for mothers beginning from the delivery, in order to start and maintain a healthy breastfeeding period.

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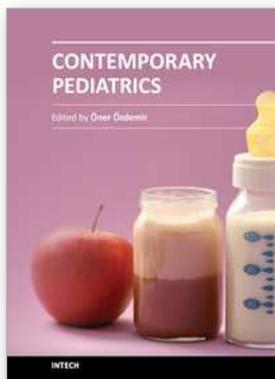
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Book Contemporary Pediatrics with its 17 chapters will help get us and patients enlightened with the new developments on the contemporary pediatric issues. In this book volume, beyond classical themes, a different approach was made to current pediatric issues and topics. This volume, as understood from its title, describes nutritional infant health and some interesting topics from pediatric subspecialties such as cardiology, hematology and infectious diseases.

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