Some Aspects Of Infant Nutrition

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INTRODUCTION -

Nutrition is an important aspect of human health. It is recognised as the primary factor in the propagation of individuals with maximum potential for physical development and maintenance of the best possible physical health throughout life. To make a nation healthier and stronger, all the individuals should be healthier which is possible with improved nutrition of infants and children as well as better nutrition of adults, mothers before and during pregnancy and lactation. In this paper an attempt has been made to discuss some aspects of infant nutrition.

Peculiarities of nutrition in infancy -

Growth is most rapid in infancy. In terms of body weight the infants need more of all nutrients. According to Toverud, Stearns and Macy the surface area of a newborn infant is about 15 %, but this body weight is about 5 % different than that of an adult. Per kilogram of body mass the newborn infant has about 700 square inches of surface while the adult has only 200. So, as the basal metabolism is related to the body surface the caloric requirement of the newborn infant is 2 to 3 times as great as those of adults. Not only does the baby require the nutrients for growth but also his requirement for maintenance are greater because of his higher metabolic rate and rapid use of nutrients. His relatively large body surface involves greater loss of heat and water through the skin. The development of skeleton imposes special nutritive requirements. The basal metabolism- metabolism and conditions of rest - is actually not basal in the growing child, for growth in infant

Some Aspects

means growth required for growth as well as for maintenance. Energy required for growth is greatest in infancy. The requirement of activity is surprisingly great even in small infants. Crying alone has been shown to double the metabolic rate. According to Toverud et al. there are different views on the caloric requirement of infants. Smith had found 480 calories per kilogram per day as the required calories for the newborn infant. Besides basal metabolism of 41 calories per kilogram of body weight he has added 30 % for bodily activity, 10 % for fecal loss, 12 % for specific dynamic action, and some growth allowance. On the other hand Joan and Marriott has figured out 155 calories per kilogram per day as follows:

	calories per kg.
Basal resting metabolism	55
Allowance for specific dynamic action	10
Allowance for activity	25
Allowance for growth	15
Allowance for unutilized food	10
Total	115

Actually the caloric requirement for infant varies individually. An underweight infant whether premature or not, has a relatively greater food requirement because of larger body surface in relation to weight and of the larger mass of active tissue, which is the main determinant of energy requirement.

Breast milk or Cow's milk

For the proper growth of infant all kinds of nutrients are necessary in adequate amounts, and milk is the only food which is palatable to the infant and contains all necessary nutrients in more or less adequate amount. After delivery, during the first 24 hours the baby is usually given boiled warm water with sugar or diluted milk. The mother's milk does not come in until between third and fifth day, but in the meantime he may be put to the breast to get practice in sucking and to receive colostrum, the secretion of mammary glands, which is a thick yellowish fluid containing less fat and more protein, ash and vitamin A than milk.

There has been a great deal of controversy regarding the use of breast milk or cow's milk as the most suitable food of infant. Most of pediatricians and specialists of the field have agreed milk as the natural and best suitable food for infants. But due to various reasons breast feeding has been decreasing. A nation-wide survey in the United States has revealed that the percentage of bottle fed newborn infants while in the hospitals

has nearly doubled within a decade. The first study in 1946 showed 36% bottle fed, 38% breast fed and 27% both bottle and breast fed whereas the second survey in 1956 showed 63% bottle fed, 21% breast fed and 16% both bottle and breast fed.

The reasons of decline in breast feeding are many and are not completely understood.

D. B. Jelliffe gives some of the facts why people are most inclined to bottle feeding:

1. Many mothers are working;
2. breast feeding is by modern convention carried out only in privacy and is, therefore, a social inconvenience;
3. there are very many efficient, relatively cheap; and highly advertised milk preparations on the market produced exclusively for infants;
4. there are many alternative pursuits and amusements for emancipated women who wish to take a more active place in the social structure of modern society;
5. there appears to be a tendency for lactation failure to be common.

Advantages of breast feeding are many. Breast milk is natural, pure, easy for babies to digest, and always of the right temperature. A breast-fed baby is never constipated and there is minimum chance of infection. In the earlier period breast feeding helps the enlarged uterus to contract easily and resume its normal position. Psychologically, it helps to develop the maternal instinct in the mother and gives a profound sense of security to the child.

It is agreed that if the mother has adequate diet, the breast-fed infant has less chance of getting alimentary diseases than the infant fed on cow's milk alone. The presence of lactose in increased amount in human milk may be its effect on intestine effect the synthesis of various nutrients. Because of its influence on the hydrogen concentration of the gut contents, it may promote the absorption of calcium and phosphorus. Moreover, from the evolutionary point of view, it is supposed that breast milk has, over a period of millions of year become specifically modified to suit the growth requirement of human infants.

Paul Gyorgy emphasising the importance of breast milk writes:

Human milk is superior to cow's milk because human milk is the physiologic food for the human infants; It is intended for the human infants; cow's milk is intended for the calf.

Referring to the differences between cow's milk and human milk he had stated that it is not only the psychological relationship between mother and infant but human milk gives to the infant a kind of better resistance to diseases. His studies have shown that nitrogen-retaining polysaccharides milk, saliva as well as derivatives of blood group polysaccharides have delaying effect on the certain experimental virus infections. So, the large content of nitrogen containing saccharides in human milk might stimulate the growth of *Lactobacillus bifidus* which possibly gives a higher resistance to the breastfed infants.

Gordon, Levine and McNamara in a study of comparison between human milk and

cow's milk concluded that mixtures of cow's milk in amounts designed to give approximately 20 calories per kilogram produced larger gain in weight than human milk did. But gain in weight is not the most sensitive comparison because excessive weight gain can be due to the inappropriate accumulations of water or fat.

Harry Bakwin and Samuel Stone recommending human milk say that though cow's milk is slightly rich in protein, lactalbumin, ash and mineral salts, human milk is naturally prepared for human infants. Breast-fed infants have shown less susceptibility to gastro-intestinal disturbances, respiratory diseases and many other infections. Another difference is, infant on human milk maintains an adequate level of ascorbic acid in blood plasma provided the mother takes the usual diet.

Emmett, Jr. and Solma E. Synderman have shown that undiluted cow's milk is good for infant nutrition provided the bacteriological problem and the mechanical problem of the curd are solved. Heat treatment and pasteurization avoid these problems but during the process much of the nutritive properties of the milk are lost. So, the infant has to be given a supplementation of ascorbic acid in some other form. They have also pointed out the more frequently encountered hypersensitivity of babies on lactalbumin, one of the protein found in the cow's milk. A single drop of cow's milk within some minutes can lead to urticaria, asthma and acute gastro-intestinal symptoms. Cases of fatalities also have been seen.

Weaning and Introduction of Solid Food—

Modern practice tends to introduce solid or semi-solid foods in the infant's diet as early as possible. This tendency, according to Paul Gyorgy, is the result of the influence of the modern advertisements on the mother, otherwise there is no scientific medical support for early mixed feeding.

According to the study of Virginia A. Beal, within ten years there have been marked changes in the introduction of solid foods in infant's diet. In 1946, cereal used to be introduced at the age of 2 months and meat at the age of 8 months. By 1955 cereal and fruits were given at an average age of one month and by the time of 4½ months of age various kinds of solid foods had been introduced.

Many pediatricians agree that infants should be given small quantities of semi-solid food by the age of about four months and should be completely weaned by nine months. They give two reasons for this: First, infant's taste appreciation is more easily widened at the early age which makes weaning a less difficult process. Secondly, it is realized that milk alone cannot supply all nutrients adequately after the age of six months.

Two leading pediatricians Dr. Lee Forest Hill and Dr. Charles Davidson May of Iowa are against the idea of early introduction of solid food in infant's diet. They have warned that this practice may result in certain dangers in the infant's alimentary canal of digestion process. According to them the argument that semi-solid food hasten the development of digestive tract and growth is not medically supported. The appearance of first teeth at the age of five or six months indicates that the natural time of starting to give solid food is not earlier than first half year life. Moreover, the intestinal walls of a young infant can be penetrated to some extent by incompletely digested protein. The fact that food products are the leading causes of allergy in infants favors late introduction of solid food.

The human infant is born with two very basic reflexes: the sucking reflex, which is related to the mother's breast, and the thrusting reflex. The early feeding of semi-solid food must overcome the thrusting reflex of the tongue which represents a real lasting psychological shock.

Against the early feeding of semi-solid food Harry Bakwin writes:

The optimal time to introduce solid food is when the oral musculature of the infant is ready to receive it, generally between three and four months . . . young infants push vigorously with the tongue against a spoon or solid food placed between the lips. At about three or four months, a change takes place. When food is brought to the child's mouth, the lips part, the tongue carries the food to the back of the mouth and swallowing follows. This is the optimal time to introduce solid food, and nothing is gained by earlier administration.

Due to the lack of iron, Vitamin C and D in both human milk and cow's milk supplemental food should be given to the infant sometime in the third to six months of life. But care should be taken that it does not come to be unnatural and as a burden or psychological shock. Iron deficiency is one of the major nutritional problems in milk-fed infants. The basic iron endowment of the newborn infant from the mother is generally 11 to 12 gms. per 100 ml. at the age of 2 to 3 months which decreases to 7 gms. per 100 ml. by the end of one year. The optimal hemoglobin concentration at the age of one year should be 12.3 gms. per 100 ml. Even superiorly endowed, well-nourished infants face iron deficiency problem. A routine hemoglobin determination of six months old infants would detect the requirement of supplementation of food containing iron. Irving Schulman's studies had shown that supplementation produce negligible difference in hemoglobin concentration during first six months in full-term infants and first three months in premature infants. So, supplementation of food in infants earlier than six and three months as the case may be is of no significance. However, after this period supplementation of food plays a vital role in the development on the infant's health.

Conclusion

Modern infant nutrition is a science which is changing with the achievements in nutritional researches as well as by fashion and fads. Milk is no doubt an ideal food for the newborn infants but solid food also must be introduced sometime within the period of infancy to provide various nutrients and make the infant used to them. Infants are individuals and their needs and body types vary to a considerable range. Different infants have different digestive abilities and nutritional needs according to their body types. So, for more iron, protein and perhaps calories solid food should be introduced in the food according to their bodily needs rather than chronological generalisation.

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