According to the objectives of the study selected relevant literature on the subject have been reviewed and placed categorically in following manner:-

1. Literature Related to the Breastfeeding Practices
   1.1. The Need & Importance of Breastfeeding
   1.2. Pre-lacteal and Colostrums Feeding
   1.3. Initiation of Breast Feeding
   1.4. Supplementary Feeding
   1.5. Artificial Feeding
   1.6. Exclusive and Total Breast Feeding

2. Literature Related to Complementary Feeding And Weaning
   (Semi solid & Solid Food Introduction).

3. Literature Related to Infants Growth & Development
1. LITERATURE RELATED TO THE BREASTFEEDING PRACTICES

1.1. NEED & IMPORTANCE OF BREASTFEEDING :-

Human milk is different from that produced by animals. The main ingredients, \textit{water protein, fat, lactose, minerals and vitamins} are available in the right proportion. It is increasingly realized that breast milk contains all the nutrients, a healthy child needs. It is rich in \textit{anti-infective substances} and provides the baby with best protection against \textit{diarrhea inflections, food allergies} etc. and thus reduces infant mortality. According to Dr. Felicity Savage from leads university, U.K.- ‘The nutrients in breast milk are specific for the human body. They need polyunsaturated fats for building the nervous system and the brain. Comprising with the cow’s milk he further, says ‘the cow’s milk contains saturated fats, which may cause heart disease later on, it also contains comparatively more proteins intended foe a calf’s rapid body growth. Whereas breast milk contains just enough protein with the right balance of amino acids needed for human beings.” (IBFAN, FORUM Report, Oct, 1989).

In India breast Feeding have not only great nutritional value for the child but it has also emotional and cultural value for the child, mother and society. Culturally it has been defined as a debt to be repaid to the mothers by sons. Various local practices promote breast-feeding and treat it as an ideal, pure natural feed for the infant. According to Sushrut Samhita (Sus. Sam. Sar.Ch.10-17 & 27 ), one of the classical literature of Traditional system of Medicine –“after delivery the breast milk is formed which nourishes the child. It is like nectar and very important for the growth and development of the child. It is said to
be as essence or updhatu of rasa (extract), and seat of life (pranayatana). After the third or fourth day of delivery the milk appears in breast due to dilation of the blood vessels. Affection to the child is most important for the milk ejection........Its flow is affected due to anger, grief and non-affection of mothers to her infant.”

Realizing the importance of breast milk in 1990, WHO and UNICEF came forward with Innocence Declaration on the protection, promotion and support of breastfeeding and 30 governments for the Global initiatives adopted it. It States that- “All women should be enabled to practice exclusive breastfeeding and all infants should be fed on breast milk from birth to four to six months of age. Thereafter, children should continue to be breastfed, while receiving appropriate and adequate complementary foods for up to two years of age or beyond.”

Human milk is the perfect infant food that nature has intended. As Mishra BK (1993) revealed, it not only adequately provides all the essential nutrients from birth to a few early months of infants’ life but also contributes towards his long health. Although, a natural process, breastfeeding is a social phenomenon, learned and not acquired instinctively. It is both an art and a science and is amendable to influences of various social and cultural factors.

Breast milk is the only insurance for the survival of the Indian infant. It is the natural cheap source of nutrition of the infant. According to NFHS-2 (1998-99) the infant mortality rate is 68 deaths/1000 live births for the period 0-4 years before the survey. It gas declined to down, from 86 deaths/1000 live births approximately 100 years earlier indicating an average rate of decline of about 2 infants deaths/1000 live birth per year. Despite this every 11th infant die before reaching the age of five.
Armstrong HC (1995) observed that, breast feeding unites food health and care enhances the child’s abilities to elicit good care through superior attachment, rhythmic synchrony and vision and brain development parental responsiveness increased by founding, child spacing and time with the body. Breastfeeding and other forms of care for nutrition share the aspects of interaction, cultural mediation, erosion of tradition, endemic misinformation small-scale decision making and under ability to institutional mismanagement.

Guerrini P (1994) has made a comparative study using fortified human milk and high-density formula with two different groups of infants. It shows that the infants receiving fortified human milk showed better growth and biochemical profiles comparable to those receiving high energy density formula.

Researches suggest that, breastfeeding way help to protect against sudden infant death syndrome (SDS). Antibodies passed from mother helps in protecting baby from some common problems such as ear infections diarrhea, allergies, pertussis and cough due to pneumonia and other respiratory infusion. Enzymes and other substance in breast milk make digestion somewhat easier and aid in the absorption of nutrients.

Madane et al. (1994) in their study conducted on 1019 mothers in 79 primary health care centers in Saudi Arabia, observed that 98% mothers have breastfeed there infants at birth. The rate dropped to 96.5% during first week of life.

Victoria G (1997) in a population based case control study of infant mortality in two urban areas in Brazil revealed that, the type of milk in an infant’s diet was found to be an important risk factor for deaths from diarrhea and respiratory infections. The infants who were breastfeed with no milk supplements and after adjusting for
compounding variables, those completely weaned had 14.2 & 3.6 times at the risk of death from diarrhea and respiratory infections respectively. Post weaning associates with corresponding relative of 4.2 and 1-6. The risk of death from infection other than diarrhea or respiratory infection was less clearly associated with breast-feeding. Cow’s milk and formula milk served to be equally hazardous. For deaths due to diarrhea the increased risk associated with not breast-fed was greatest in the first two months of life.

Forste R (1998) revealed the effects of breast-feeding and supplementation practices on diarrhea occurrence and stunted growth modeled using logistic regression techniques. Data from the demographic and health survey of Bolivia 1989 mentioned that among children aged 3-36 months at the date of interview, the benefits of breast feeding to child health were most pronounced among children living in rural poverty. Reduced breastfeeding among these children increased the likelihood of diarrhea and stunted growth. In addition the introduction of solid foods to currently, lactating infants negatively influenced child health.

Bandekar SB et al. (1994) in their study on 4879 samples find out that 96.0% of infants of <4 months old receiving breast milk among them only 37.0% are exclusively breastfed. Timely complementary feeding rate was only 0.48 % and around 23.0% mothers feed their infants with bottles.

Enrique R et al. (1992) reported in his study that, actual infant feeding practices at two weeks were 3% breastfeeding only; 19% bottle feeding only; 51% combining breastfeeding with bottle feeding using formula; 23% combining breastfeeding with bottle feeding using a non-milk product and 4% combining breast feeding with using a non–formula milks. At two weeks 95% of the mothers gave their infants
non-milk products most often tea (95%), grapes syrup, water (52%), rice or cereal water (13%) and honey (7%) etc.

Most of the earlier studies (ICMR; 1984, Agarwal et al, 1986) prove that in India, breast-feeding is a universal phenomenon in the traditional families. But as revealed by some of the studies (Agarwal and Agarwal, 1980; Agarwal et al, 1982), it was subjected to decline particularly, in urban areas especially, among the urban elite still, it has not reached to the stage of irreversibility.

As Gapujkar et al. (1984) has mentioned, the compiled data from The Scientific report (No. 4) of Nutrition Foundation of India, on breast-feeding from three metropolitan cities of Calcutta, Bombay, and Madras shows that even at the end of the first year more than 90 per cent of infants in Calcutta, 85 per cent in Bombay and 70 per cent at Madras were receiving breast-milk.

Lawson M (1998) in his study, found that the overall breast feeding rates have improved over recent years but it has not been improved significantly, among the sectors of the population having low rates of breast feeding. The study suggests that there need to orient mothers with the practical skills related to breast-feed and health care.

According to Ladas (1970), for successful breast-feeding, the mother needs information advice, practice, encouragement and support. The facilitating conditions for breast-feeding are most effectively provided on an interpersonal and intimate basis. It is therefore, understandable that until recently as Raphael (1976) has observed, in most cultures young women depended on the experienced females in the extended family or other immediate social groups for information and support for successful breast-feeding.
Studies by Becon and Wylie (1976) indicated a positive correlation between a women’s success in breast-feeding and her husband’s positive attitude towards breast-feeding. In many other societies, breast-feeding is deeply rooted in the cultural matrix. Very often, cultural values establish people’s general attitude towards breast-feeding and number of norms and practices are there that may help or hurt breast-feeding.

A negative correlation between education and duration of lactation is reported in several studies (Jain & Bonga Arts, 1981; Butz & Davanzd, 1981; Saxena, 1977). It is observed that, in general, educated mothers breast-feed for shorter duration. However, in recent years a reverse trend is emerging even in the developed countries and also in the economically better-off families in the developing countries. Perhaps, they are convinced of the advantages of breast-feeding.

1.2. PRELACTEAL AND COLOSTRUM FEEDING

Generally, for the first few days (1-3 days) lactation does not occur among most of the new mothers. Therefore, as some of the studies shows (T Rao, 1957; Anand & Rama Rao, 1962) normally, almost all over India in different communities a variety of material used as first feed in different composition, with different reasoning, purpose and explanation. It is well recorded by different scholars that Pre-breast feed is given to maintain newborn hydration and nutrition, to improve his immunity and to promote its cognitive development. There are several cultural significance and values also involved with the practice. One of the study (Mira, Sadgopal, 1996) has summarized all the prevalent pre breast feeds from different parts of the country.
Accordingly, cow milk and then goat milk are the most common prelacteal feed followed by honey and sugar water. According to Anand (1990) modern practitioners discourage any sort of feeding before breast-feeding. According to them sugar water and cows milk formula are very irritating. Narayana (1980) observed that giving prelacteal feed as a routine may interfere with the mothers confidence and hence, let down reflex and sucking stimulation and prolactin production.

Parthasarthy A et al (1999) stressed that, a vast majority of newborns in our country are not given colostrums or receive prelacteal feeds such as honey, sugar, glucose, water and artificial milk before the free flow of milk from the breasts. This should be discoursed in a sympathetic manner by minimizing conflict with traditional beliefs. Such feeds may also be contaminated. Allergies are more common in babies given artificial milk, including powder milk in the first months of life. If these feeds are given with a feeding bottle, the baby may get confused to the nipple of the bottle and may not make necessary effort to suckle and empty the breast. This either results in breastfeeds failure or engorgement or even infection of breast.

Hirwarkar et al. (1999) in their cross sectional study on 176 rural mothers found that prelacteal feeding was practiced by 47.7% mothers. Among them 64.1% from joint families and literate group 67.9% were giving prelacteals to their babies. A statistically significant association was observed between prelacteal feeding and type of family and educational status (illiterate) (p<0.01). Honey (85.7%) water (54.8%) Cow’s milk (19%) and jaggary (14%) was used as prelacteal feed. Reasons for giving prelacteal were tradition and culture (28.6%), grandmother’s advice (58.3%) and first feed of infant (13.1%).
Haider R *et al.* (1999) conducted a study on 1100 lower middle class mothers in Dhaka, with infants aged 0-6 months. Although 99% of mothers fed colostrums within 3 days of delivery, 92% also gave one or more traditional prelacteal, and 68% gave post lacteal.

Olcolo SN *et al.* (1999) in their study on 310 mothers in five rural communities in Nigeria, find out that the practice of discarding colostrums and replacing it with a wide range of prelacteal feeds and late initiation of breastfeeding has implications for health education programs and neonatal feeding strategies.

After childbirth the early breast secretion that is thick, straw colored and sticky named as ‘Pahla Dudha’ (first milk), or ‘Bad milk’ and ‘not milk’ as opposed to ‘Real milk’. The traditional system of Indian Medicine named it as ‘Peeyush’; (equal to amrita) and western science uses the term ‘Colostrums’. According to Modern science (*Savage*, 1983) colostrums is very special protective substance (protein) an immunoglobulin that protects baby from infection. There are 20-40 times more immunoglobulin in colostrums than in mother’s blood it forms a protective layer in the intestine of the baby and prevents many kinds of infection. Due to reason, **WHO & UNICEF** in their Joint Statement (1989) accepted Colostrums as the infant’s first immunization and recommends that ‘necessarily, it should be given to the infants’.

As some of the studies (*Rao et al.*, 1972; *Ojha*, 1979) show colostrums rejection as well as its use both are prevalent as tradition in different communities. The study conducted by lok Swastya Parampara Samvardhan Samiti and CHETNA, Ahmedabad (*Her Healing Heritage*, 1996) shows that in the states of Bihar, Maharashtra, Karnataka, Kerala, Orissa, Tamilnadu and West Bengal
most of the women do not remove colostrums whereas in UP, MP, Rajasthan Gujrat and in some parts of the Karnataka, Bihar, Tamilnadu and West Bengal women did remove colostrums but not in a fixed amount. Some times it is one, two, or five teaspoonful because the first milk is stored in the body for a long and is stale. It is also squeezed to ensure a clean and clear passage and to avoid the first secretion causing colic or diarrhea to the infant.

Singh MB et al. (1997) in their study found that, the rural woman of Jodhpur area believes in old deep rooted belief and customs, which in turn deprive their infants from advantage of colostrums. Around 77% among rural women discarded colostrums, a nutritionally rich supplement, which other wise should be supplemented to them at any cost in order to keep them healthy.

Bhosle NA et al. (1997) in a study conducted at Immuno-prophylaxis Clinic at Govt. Medical College, Nagpur found that 62.67% mothers of infants initiated within 24 hrs. after birth. About 22% mothers used prelacteal feeds. The prominent area of concern includes discarding of colostrums.

Lipsky et al. (1993) reported in his study that the women in rural Mexico though breastfeeding preferred bottle feeding. About 80% initiated breastfeeding and 69% gave colostrums but the breastfeeding was discontinued at very early.

Ahmed S et al. (1990) revealed that although breastfeeding is almost universal in Bangladesh but the mothers knowledge regarding proper breastfeeding is poor. Among all the women interviewed only 12% stated that the first food for the newborns should be colostrums. Haider R et al., 1999) observed that in higher societies at Bangladesh about 99% mothers fed colostrums within 3 days after delivery, 92%
also gave pre lacteals and 68% gave post lacteals. They advocated that only colostrums was not sufficient

**Okolo SN (1999)** in their study in Nigeria found that, mothers belonging to higher economic status and who were highly educated gave colostrums to their babies. About 54% mothers of lower economic status and comparatively less educated did not give colostrums to their babies.

### 1.3. INITIATION OF BREAST FEEDING

*Researches have shown that the infant has a biological pre programmed instinctive behavior at birth. The infants’ needs to be with his mother so that he can by himself indicate when he wants to be breast-fed. One experiment shows such attempts made by infants in the first 40 minutes after birth and started sucking at a mean age of 55 minutes (IBFAN Report, 1996).*

According to **BPNI/UNICEF (2001)** immediately after delivery the first few hours are very important for the mother and the baby. Early initiation of breastfeeding helps to develop a bond between the mother and the baby. It insures secretion of colostrums which is highly notorious prevents neonatal and therefore, reduces the risk of hospitalizations in newborn period, reduces maternal postpartum bleeding, stimulate contractions & expulsion of placenta and helps to established breastfeeding successfully.

Researches have repeatedly revealed that, when mothers do not start breastfeeding early, their babies do not develop normal feeding patterns, until the fourth or fifth day. The reason is that the suckling reflex is strongest in the first half-hours after and thereafter it fades. If the feeding at the breast is delayed for 24 hours, the infant may need to be taught how to suckle, particularly, if bottles or pacifiers
have been given during that time. Use of bottles or pacifiers produces ‘nipple confusion’ in babies.

Therefore, it is important to provide proper information to the mother and family regarding early breastfeeding initiation.

**WHO/UNICEF (2001)** has recommended that, breastfeeding should be initiated within first half an hour of birth (it is one of the important step out of 10 steps towards successfully breastfeeding).

**Bhosale NA et al. (1997)** in their clinic based cross sectional study reported that in 62.67% of children, breastfeeding initiated within 24 hours, after birth. About 22% mothers used prelacteal feed and 70% mothers preferred demand feeding.

**WHO Update-2001** reported that, in our society mothers face lot of problems initiating breastfeeding within half hour of birth. The first feed should be given in the delivery room before hand over to the parents. There are certain belief and practices that don’t encourage early initiation of breastfeeding, thus creating opportunities to give artificial/bottle feed to the newborn. They are :

(a) Lack of awareness regarding importance of early initiation breastfeeding.
(b) Lack of counseling and practice help by the health workers to initiating breastfeeding.
(c) Family members and sometimes health professional believe that the mother needs rest and consider breastfeeding a difficult experience.
(d) Belief by certain people that thick-yellow milk that comes during the first few days is not good for the baby.
(e) Practice the does not allow the mother to initiate breastfeeding till an aunt arrives and washes mother’s breast.
Laurance BM (1993) in his study in London on two group of infants, one group fed early & the other late, found that the discrepancy in number was due to the fact that quite a number of the time intended the early feeding was on average 8 hour after birth with variation of about 2-12 hours while late feeding was 15-56 hours after birth with an average of about 36 hours. In the late fed group there was high mortality, more hygiene membrane disease, higher incidence of jaundice and producing mental retardation.

Ray et al. (1997) in their study in a slum area of Varanasi found that only 3.5% of the mothers started breastfeeding on the first day majority (80.4%) of the mothers started it on the third day onwards and 16.1% on the second day. Reasons for delayed breastfeeding were elicited and it was found that in 58.7% mothers milk secretion was absent. 33.8% mothers said that it was traditional while in 7.5% subjects mother’s illness was responsible for delayed breastfeeding.

Vastdyan et al. (1996) in their report said that 6.78% male and 13.2% female infant received breast milk within one hour of birth while 90.96% and 93.21% recurred within one day of birth respectively.

Armstrong HC (1995) reported that average initiation rates drawn from the World Fertility Survey (WFS) and Demographic and Health Survey (DHS) in developing countries approximated 92% between 1997 and 1989. More recent DHS figures for breastfeeding initiation rates are found among less comprehensive data from Jordan (66%) Israel (84%) the Netherlands (66%) Luxembourg (64%) the United Kingdom (63%) Croatia (59%) the United State (56%) France (55%) and Ireland (30%).

Kumji P et al. (1999) reported in his study that women who breastfed (78% ) said that they did so because it was ‘healthier’.
Among those not breastfeeding said that there was no specific reason for it while 20% ‘hated that idea’ and 19% called ‘time’. The physicians encouraged about 73%.

Neifert MR (1999) reported that, human milk is universally recognized as the preferred nutrition for infants. Exclusive breastfeeding is ideal for the approximately 6 months of life and continued breastfeeding complemented by solid foods is recommended throughout the baby’s first year, and longer if desired. This article offers counseling strategies to help physicians to promote successful breastfeeding, beginning with prenatal education and a screening breast exam to detect lactation risk factors. Optimal initiation of breastfeeding is reviewed, including supportive hospital practices, correct breastfeeding technique and the regulation of mild production. The early follow up of the breastfeeding infants and criteria for assessing the successful initiation of breastfeeding are discussed. Practical strategies are offered for preventing and managing common lactation difficulties, such as postpartum breast engorgement, sore nipples, maternal employment, and impaired let down.

1.4. SUPPLEMENTARY FEEDING:

Results from recent studies indicate that the majority of neonates in Africa, Asia and Latin America are breastfed. However the same surveys show that exclusive breastfeeding i.e., giving the infant no other fluid/food than breast milk is a very infrequent practice. Water and/or tea are offered to young infants, often, from the first week of life, in the belief that they will relive pain (e.g. from colic, earache), prevent and treat colds and constipation and especially, quench thirst. The intake of such supplementary fluids is associated in young infants
with an increased risk of disease and a shortening of the duration of breastfeeding.

The latest UNICEF publication on infant feeding repeats this recommendation-"Babies should be exclusively breastfed- meaning that they receive nothing but breast milk, not even water for about the first six months of life. Except in the rarest cases, no additional foods or fluids are necessary and they can harmful introducing germs, triggering allergies and filling the stomach so that the infants takes less breast milk."

Scariati PD et al (1997) in their study on a panel of US woman of fairly – socio-economics- status find out that about one fourth (24.7%) of the reported giving their neonates water at least 3 times per week. Stratification by the feeding practices and socio –economics factors revealed that 41.6% of mothers who formula fed their neonates among them 47.4% mothers with less than a high school education and 33.4% of mothers with an annual family income less than $22,500 gave their neonates water at least 3 times/week water supplementation of neonates was a prevalent practice in this cohort of women.

Madani KA et al. (1994) in their study conducted on 1019 mother in 79 primary health care centers in Saudi Arabia, found out that 68.9% of mothers gave supplemental liquids to infants during the first 3 days of their life.

Okolo SM (1994) investigated and find out in their study that one or the other supplements were offered to the infants by all the mothers. Only 28.6% of babies were breastfed within 24 hours of birth.

WHO Update (1991) recent research has demonstrated that, giving young infants supplementary fluids such as water and/or teas in addition to breast milk is associated with a significant increase in the
risk of diarrhea disease. In a study conducted in poor urban community in Lima-Peru the incidence of the prevalence rates of diarrhea in infants younger than 6 month were significantly higher among those who were exclusively breastfed. A case control study of infant mortality in Brazil showed that infants who received water, tea or juice to breast milk were at increased risk of diarrhea death. Each additional feed with these fluids substantially increased the risk of death.

Lefeber Y (1999) in Netherlands, found that there is a custom of feeding infants with sugar. About 99% of the infants were fed with this syrup in first 3 days of life.

Young infants who received their supplementary fluids have a lower intake of breast milk that if they are exclusively breastfed and are also more likely to be breastfed for shorter periods. The average daily fluid requirement of a healthy infants ranges from 80-100 ml/kg in the first week of life to 140-160 ml/kg between 2 and 6 months, depending on the concentration of the feeds, energy consumption, and environmental humidity and temperature. Consumption below the required level will lead the dehydration, with increase in serum and urine osmolarity.

Almonoth A. (1990) revealed that the immature kidney of a very young infant can achieve a urine concentration of 700 osmolarity and healthy infants can attain a concentration of up to 1200 OSM by the age of 3 months. Out of more than 213 samples that were examined. Over 90% had an osmolarity that was well below these levels, indicating the absence of dehydration. Only in 14 samples did urine osmolarity exceed 7000 Osm of these all but two, which came from
children who were nevertheless considered to be in adequate water balance.

Sachdev HPS et al. (1991) conducted their study and find out that 63% of 70 doctors advocated water and tea supplements. 45 healthy male exclusively breastfed babies, aged 1-4 months were recruited from a well-baby clinic who had never received supplemental water along with a random selection of 14 other were allocated to group I (breast milk only) the remaining 22 infants were allocated to group II (breastfed milk plus supplemental fluid according to the mothers usual practice). The babies were studied at the hospital for 8 hour, breast milk intake was measured by weighing the infants before and after each feed, water intake by calibrated bottles and urine output by accurate collection and measurement. The maximum room temperature was 34-41°C and relative humidity’s 9-60%. In-group- II, the mean water intake was 11% (95% confidence interval 7-16%) of the total fluid intake. Both breast milk intake (274 vs 210 ml) and total fluid intake (274 vs 233 ml) were higher in group I than in group II, after adjustment for age, weight, length, room temperature, and humidity. However, there were no significant differences between the groups in urine output urine or scrum osmolarity, weight change or rectal temperature whether or not the factors adjustment for included total fluid intake. Thus exclusively breastfed infants do not need supplemented water to maintain water homeostasis a reduced breast milk intake is a potential disadvantage of this practice.

Lowerence RA (1999) stressed that giving additional water to infants is related to an increased diarrhea, decreased consumption of breast milk (and therefore, fewer calories more likely probability to be weaned from the breast before 3 months of age). Finally, by not
restricting a baby’s time at the breast and by not offering supplemental liquids or foods, a mother helps maintain her milk supply reduces risk of ‘nipple confusion’ or preference by the baby and thereby helps to have a plentiful supply of milk for her baby.

1.5. ARTIFICIAL FEEDING

Although most mothers can breastfeed, many for economic or social reasons, choose not to do so. Nutrition education with regard to artificial feeding requires especially careful handling. Among underprivileged semi sophisticated mothers the bacteriological risks of using a feeding bottle are great. In many parts of the tropics, it may be considered less dangerous to advise the use of the cup and spoon or metal feeding cup.

Realizing that aggressive marketing of infant foods and feeding bottles leads to a decline in breast-feeding, the WHO assuredly, in 1981 passed an International Code of Marketing of Breast Milk Substitute. In 1992, the Government of India passed “The Infant milk substitute, Feeding Bottles and Infant foods (Regulation of Production, supply and distribution,) Act, 1992”. The act does not allow advertisement of infant milk substitutes provides or feeding bottles No display of play cards or posters of baby foods or feeding bottles is allowed in the hospitals. Incentives or inducement to mothers or health workers for painting the sale of products under the Act is prohibited. The labeling on the tin ant educational material dealing with prenatal or postnatal care or with infant feeding must include details outlined in the Act. Violating the Act can be fines or imprisoned.

Lin YT & Tsan CL (1999) observed that 39% subjects showed a bottle-feeding habit. The overall prevalence of ‘baby bottle tooth decay’ (BBTD) was 15.4%. The habit of bottle-feeding was
significantly related to BBTD. The defects score for children who were bottle-fed was significantly than children who were not bottle-fed.

Some of the well documented earlier studies (Plank & Malanesi, 1973; Agarwal & Agarwal, 1979; Agarwal, 1982 & 1985) show that artificially-feed infants contact diarrhea, respiratory and other infections more commonly as compared to breast-fed infants.

**Udall JN & Suskind RM (1999)** reported that, the ingestion of human milk, “humanized formulae” or whole cow’s milk has consequences for human nutrition. *Gastro-esophageal reflux, iron deficiency, Calcium and Sodium excesses or deficiency* may be influenced by the type and amount of milk fed to the infant. Likewise, neurological development and possibilities of developing diabetes or cancer may also be influenced by early dietary practices.

**Jiang T et al. (2000)** find out that, fecal hemoglobin concentration during formula feeding was higher than previously observed in younger infants. Nine of 31 infants responded to complementary feeding with increased fecal hemoglobin concentration. Fecal hemoglobin concentration of the 1 responders rose from $1,395 \pm 856 \mu g$ of dry stool to $2,711 \pm 1732 \mu g$ of dry stools. The response rate was similar to that in younger infants. Quantitative hemoglobin execration were based on spot stool hemoglobin concentrations milk feeding was not associated with recognizable changes in stool. No characteristics or where their clinical signs related to fecal blood loss. Iron was similar except that after 3 months of cow milk feeding shows lower ferritin concentration than non-corresponds.

**Bekel & Berhanc Y (1999)** in their study found that the overall prevalence of bottle-feeding was 11.3% of the 174 children who were
bottle-fed. Among them 11 only were exclusively on it. Residence, material, education and occupation were significantly associated with the practice of bottle-feeding in the crude analysis and after adjusting for parental and child characteristics (P<0.05). It is concluded that the extent of bottle-feeding in the studied communities is generally, high with a higher rate among town woman.

_Uauy R et al (2000)_ observed that ‘lipids’ are considered the most important energy source in the infant diet and are necessary for normal growth and physical activity. Human milk, in which most of the energy is present as fat provides a relatively high cholesterol intake. Infants fed human milk have higher total and LDL- cholesterol concentration in plasma than do formula – fed infants (P<0.05), whereas plasma HDL- and LDL – cholesterol concentration are lower in formula-fed infants if a formula high in linoleate is fed (P<0.05). Infants adapt to the high cholesterol content of human milk through a decrease in cholesterol synthesis, in contrast the addition of cholesterol to formula to formula do not suppress synthesis.

_Durso H. (2000)_ while discussing the nutritive values and composition of _goat milk_, with particular reference to the lipid, amino acids, minerals and vitamins also made comparisons with cow and human milk. He found useful, the use of goat milk in cases of cow milk protein intolerance and in other dietary therapies.

### 1.6. EXCLUSIVE & TOTAL BREASTFEEDING

_BPNI (2001)_ mentioned that In India, about 25 million babies are born each year, ideally all should be _exclusively breastfed_ for the first six months, but there are about 13 million ‘dropouts’ by there months of age and about 20 million ‘dropouts’ by the age of six months. One of
the major reasons for this is the “lack of accurate information with the people”.

In 1990, 71 heads of State and Government agreed at the World Summit for Children on a set of goals for children and their development in the 1990s. In the resulting World Declaration and Plan of Action, high priority was given to recreating an environment that would enable all women to breastfed their children.

Lowerence RA (1999), in his book referred that several well-known organizations have public statements encouraging exclusive breastfeeding for the first 4-6 months of baby’s life. As he mentioned-

**American Academy of Pediatrics** says: “66 exclusive breastfeeding is ideal nutrition and sufficient to support optimal and development for approximately the first 6 months after birth.”

**World Alliance for breastfeeding Action (WABA)** says: “Exclusive breastfeeding without other floods or fluids for the first 6 months is the best start for all babies.”

**Le Leche League International** believes: “For the healthy, full-term baby, breast milk is the only food necessary until infants shows signs of needing solids, about the middle of the first years after birth.

**The Nursing Mother Association of Australia**, says: “Breast milk is sufficient for the growth & development of healthy, full term infant for at least six months. Other fluids, solids or vitamins are necessary besides unless medically indicated.”

**UNICEF (1999)** together with the World Health Assembly (WHA) and many governments maintains that the infants feeding recommendation in general are for breastfeeding to be exclusive for about 6 months. In public health policies and communication, what will produce the highest attainable standard of health for the majority of
infants are what determines the recommendations? Further, this is clearly stated in WHO/UNICEF Integrated Management of Childhood Illness (IMCI) Materials, that “most babies do not need complementary foods before 6 months of age.”

Bandekar et al. (1994) in their study reported that only 37% infants were exclusively breastfeeding 96% of infants of 4 months old received breast milk. 23% mothers bottle feed their infants supplementary food or water.

WHO, in its several documents including (1999-2000) statement, makes the argument that “an age range is an essential element of this feedings recommendation.” Although, it also recognized by WHO and others that providing health workers and mother with ‘an age range’ is confusing. In other documents such as the materials for the ‘Integrated Management of Children Illness’ (IMCI) and ‘Breastfeeding’, ‘the Technological basis’ and ‘Recommendation for action’, the terminology of exclusive breastfeeding “for at least the first 4 months of life, and preferably 6 months” is used.

Exclusive breastfeeding can save many lives preventing malnutrition and infections. Exclusive breastfeeding gives babies the best start in life. Breast milk is the best food available and is tailor made to suit the child’s needs. Breastfeeding babies get the most nutritionally balanced diet and are less susceptible to infection.

Chen SH et al. (2000) in their study in Taiwan revealed that oxygen saturation and body temperature of infants who where exclusively breastfeeding, was slightly higher. The stressed that breastfeeding is more physiological feeding for the infants. Okolo SN et al. (1999) in their study found out that, although breastfeeding is widely practiced but none of the babies exclusively breastfed.
Haider R et al. (1999), find out that the younger child, the more lies or physical as well as emotional welfare is dependent on care. Yet, the time and knowledge required for feeding increase to a maximum when the child is 6 to 18 months old. Until, 6 months of age breastfeeding can meet the infants nutritional needs any additional time or the resources spent on feeding of supplements are usually unnecessary & may be harmful. As the child grows older, language capabilities and mother skills enable him on her to better express and independently respond to his or her own hunger signals.

Mathur S et al. (1994) studied the growth of infants who were exclusively breastfeeding for 6 months. The average weight of boys and girls was almost equivalent to the 25th percentile given by the NCHS Standard up to 3 months of age, but decreased to below these standard thereafter. The average length in boys and girls was between the 25th & 50th percentile. The average head circumference in girls was between the 25th & 50th percentile at all ages but in boys it was between 10th & 25th percentile at 4, 5 months of age.

Almazrov YY et al. (1994) find out that only 55% infants were exclusively breastfeeding for one month without any supplement in Saudi Arabia.

Savino F et al. (1994), in a cross sectional study in Italy, of milk feeding infants during the first year of life, found that 75% infants were exclusively breastfed and 2% were breast and formula fed at birth. The mean duration was around 3 months.

Armstrong HC (1995) said that the duration of breastfeeding might be high where early supplementation prevails in the countries covered by 1977-1989 WFS and DHS studies, the age at which 50%
of mothers said their babies were no longer breastfeeding ranged from 1.5 months to 24 months.

In an extensive study covering six cities of India (ICMR, 1984), it was found that in general prolonged breast-feeding was the rule in all regions. Between the ages of 1-2 years, more rural children rather than urban were found to live exclusively on breast-feeding. But still there are disturbing finding like rejection of colostrums, a decline in percentage of mothers doing exclusively breast-feeding by 4 month of age and early introduction of commercial baby foods. If these trends continue unabated, we may also reach a stage, which the developed countries enjoyed a decade ago. Such trends in the fall of breast-feeding rates could be catastrophic to our infants because of the fact that they live in poor conditions of environment with poor access to health services. A large number of deliveries conducted by untrained or poorly trained traditional birth attendants.

Easwaran & Dharmarajan (1987) found in a study that the trend towards prolonged breast-feeding was higher in low-income groups and the breast fed infants surpassed the artificially fed infants in all body measurements.

It is also reported that the mean duration of breast-feeding is relatively lower in urban areas. Knodel & Debavalay (1980) have given an interesting finding. They discovered that women born in rural areas, but living in Urban areas, breast-feed more than those born in Urban areas. However, rural born Urban women breast-feed considerably less than those living in rural areas.

Kahraman H et al. (1994) studied 482 breastfeed infants in Turkey at the age of 1,3 & 6 months and concluded that at the end of 1,3 and 6 months of life around 77.9%, 56.2% and 11.9%,
respectively, were exclusively breastfed, this decreased to 37.5% by the end of the sixth month.

**WHO (2000),** highlights from the global data base on breastfeeding shows that the rates for exclusive breast feeding to under 4 months of age are very low in a number of countries in the African Region. In Central African Republic it was 4% (1995), in Nigeria 2% (1992) and in Senegal 7% (1993). In other countries, rates for exclusive breastfeeding, though low, have shown a gradual increase during recent years. At Benin it increased from 13% (1996) to 16% (1997), at Mali from 8% (1987) to 12% (1996), at Zambia from 13% (1992) to 23% (1996) and at Zimbabwe from 12% (1988) to 17% (1994). The increase in exclusive breastfeeding rates is mainly due to breastfeeding campaigns, and additional Baby-Friendly Hospitals and trained breastfeeding counselors.

Sweden tells a very different story where ever breastfed rates (after In the South-East Asia Region, the ever-breastfed rate has increased somewhat in recent years, for example in Thailand it raised from 90% (1987) to 99% in (1993). The exclusive breastfeeding rate, though low, has increased from 0.2% (1993) to 4% (1996).

Despite breastfeeding’s numerous recognized advantages over artificial still, breastfeeding rates are typically low, and only slowly improving, in the European Region. This is the situation in France, Italy, Netherlands Spain Switzerland, and the United Kingdom (1990) are 98%. Recent data shows that Armenia has increased its exclusive breastfeeding rate for under 4 month infants from 0.7% in 1993 to 20.8% in 1997, Poland from 1.5% in 1988 to 17% in 1995 and Sweden from 55.0% in 1992 to 61% in 1993.
In the Eastern Mediterranean Region, the exclusive breastfeeding rate in some countries is high compared to countries in other regions. Egypt and Saudi Arabia have an exclusive breastfeeding rate for the under 4 months infants was 68% (1995) and 55% (1991), respectively. Pakistan shows an increase in exclusive breastfeeding for under 4 months infants from 12% (1998) to 25% (1992).

Data for America shows that, ever-breastfed rates are high in some countries (Chile 97% in 1993 Colombia 95% in 1994), whereas the rates of exclusive breastfeeding under 4 months though, high compared to societies in the other regions, shows a slight decrease (Bolivia 59% in 1989 and 53% in 1994; Colombia 19% in 1993 and 16% in 1995).

In some countries where the advantage of breastfeeding have been widely publicized and where the Baby-friendly Hospital Initiative has begun in earnest, breastfeeding rates are actually increasing, e.g. Australia, Canada, China and USA.

2. LITERATURE RELATED TO COMPLEMENTARY FEEDING AND WEANING (Semi Solid & Solid Food Introduction)

In India, mothers are not always clear or aware that complementation and replacement of breast milk are two separate components of the weaning process. Thus mothers rarely advised how to achieve complementation that is to avoid unintentionally replacing breast milk by proceeding so much additional food and fluid that breast milk production is reduced. It is assumed that the breast milk quantity gradually declines from high levels a few months after delivery to low levels a few months later, and that both these levels are somehow
biologically predetermined rather than the result of largely behavioral factors.

Complementary foods can be defined as any (in semi solid or solid form) non-breast milk foods or nutritive liquids given to young children during the period of breastfeeding.

Beal (1957) reported that by 1955 cereal and fruit were commonly given to infants by one month of age, even though mothers complained that their babies often did not accept solid foods well until at least two and a half months of age. Ferris et al (1978) in an infant-feeding survey in western Massachusetts reported that 57 percent of the 268 infants were fed solids, usually cereal, before 4 weeks of age and by 8 weeks, 87 per cent of the participants were eating solids, generally, cereal and fruits.

Stewart et al. (1974) showed that the period of largest intake of commercial foods in the United States is from 3 to 9 months of life. Fomon (1975) reported that most American infants receive solid foods by six weeks of age and a large proportion of them were already eating solid foods even by 4 weeks of age.

Taitz (1971) on a survey of 240 infants at 6 weeks of age in Sheffield found that every baby was receiving solid foods and that many of the infants had been taking supplementary foods, especially, in the form of cereal, since the first week of their life. Oates (1973) in a survey of 100 infants under six months of age in London found that solid foods are most commonly introduced between 3 and 4 weeks with the earliest age reported as two days. Sleigh & Ounstead (1975) found that by two months of life, 72.5 per cent of the infants studied in the Oxford area were receiving solid foods. Those who were bottle-fed
were more likely to be eating solid foods than those who were breast-fed.

Although solid foods are being introduced earlier, there does not seem to be a consensus concerning when the optimal time for such food. **Kenna (1974)** suggested four months of age or 15 pounds of weight of the infant whichever comes first. **Silver et al. (1975)** suggested the introduction of *rice cereal* at 2-4 months, *vegetables* at 3-4 months, *fruits and juices* at 4-5 months, *strained meat and egg yolk* at 5-6 month, *bacon* at 8 months and finally, *chopped table food* at 9 months and *egg white* at 12 months.

**Illingworth (1975)** says that there is no rule for the timing of the introduction of solids, but he suggests not waiting longer than 3-4 months of age. He is of the view that if the parents do wait longer, the infants will resist the introduction of new food.

According to **Gellis & Kagan (1978)** current pediatrics theory advises delaying the introduction of solid foods until at least three months of life but states that later introduction of solid foods would be even better.

**Brown & Sharma (1999)** reported that, optimal age of introduction of complementary foods is controversial because of the so-called “weaning dilemma” whereby delayed initiation of these caused malnutrition, while premature introduction of these foods is accompanied afterwards by increased morbidity and mortality from infections.

**Hop LT et al. (2000)** conducted their study with four groups of newborns children consisting of 90 infants born in 1981, 90 in 1982, 60 in 1983 and 60 in 1984. Weights and heights of children were measured monthly up to 1 year and after every 3 months for the year-2
and 3 and on every 6 months for the year-4. Information for feeding practice and diseases of the children was obtained by interviewing the mothers during each home visit and Anthropometrics measurements were also taken. These studies show that there was association between feeding pattern and growth in length in months. Partially breastfed and weaned infants gained weight more slowly while 1 to 3 months exclusively breastfed infants grew more quickly in both weight and length. From 3 to 6 months exclusively breastfed infants gained more weight compared with other groups. Morbidity found significantly lower for the 7 & >3 months exclusively breastfed group.

Vaantera M et al. (2001) investigated that complementary food were introduced early to newborns among rural families. Education & family planning may improve adherence to infants feeding recommendations and reduce the incidence of early childhood malnutrition.

Gibson RS et al. (1998) after assessing the nutrient adequacy of a variety of complementary foods in parts of India, New Guinea and Philippines and Thailand reported that, complementary foods should provide approximately 25-50 % of total daily requirements for protein, riboflavin and copper, 50-75% for thiamin, calcium and manganese, and 75-100% for phosphorus Zinc and Iron. Most or all appear to meet the estimated daily nutrient from complementary foods for protein, thiamin and copper (per day) but not calcium, iron and in some cases zinc, even if moderate bioavailability for iron, and zinc is assumed (Even if strategies to improve the bio-availability of iron and zinc are employed). They are probably insufficient to overcome the deficits in calcium iron and zinc. Therefore, research on the feasibility of fortifying
plant-based complementary foods in developing countries with iron and zinc is urgently required.

Dewey KG et al. (1992) found out that the nutrient density of complementary foods consumed after six months were lower and morbidity rates were much higher. These results indicate that growth faltering of infants was due to the low nutrient density.

Ilson R et al. (2000) observed the importance of good complementary feeding practices in achieving optimum health, growth and development of infants and young children. This review of current infant and child feeding practices in the WHO European Region, focusing particularly, on countries of the former Soviet Union and Central Asian Republic, has identified a number of nutritional recommendations from the former Soviet era, which differ from guidelines for the these age group. A WHO Working Group was therefore, worked out updated recommendations on complementary feeding which are appropriate for the WHO European Region.

Jellief DB (1968) the word weaning is often employed somewhat loosely and with slightly different meanings. The original use of word is clearly shown by its derivation form the Anglo-Saxon “wenean” meaning, “to accustom”. The present day Oxford dictionary defines weaning as “including to feed otherwise than from the breast” Now-a-days the word is often applied somewhat discriminatory to any change from one type of diet to another in infancy for example, from the breast to bottle fed animal milk, from animal milk to a mixed died etc. In the present account the weaning period is taken as the phase extending from the times when the baby is only breastfed until he is feeding entirely on the adult diet.
Pediatricians are agreed that the infant should be given small quantities of semi solid foods by the age of about four months, and can be weaned from the breast completely by nine months. There are two reasons for this firstly, it has been suggested that infants taste appreciation is more easily widened at this stage thereby making weaning a less difficult process. Secondly, it is realized that after about six months milk cannot supply all food factor adequately being especially deficient in iron.

Solids should not be introduced too early because infants are most likely to develop allergies to then in early months. But infants differ and the programme of additions depends on the individual baby’s developmental redlines not on any rigid schedule.

Faber MF & Bebade AJ (2001) reported that most mothers had a positive attitude towards the use of infant cereals recognizing the health benefits. The cost of the product is high compared to the amount of money spent to feed at household. The quantity of infant cereals used was inadequate and total dietary intakes were below 67% of the recommendable levels, for calcium, iron, zinc, vitamin B6 and vitamin B12. It was found that the concept and the health benefits thereof are recognized in the rural community.

Agarwal et al. (1986) observed that the time of introduction of semi-solids varied with respect to the performance of certain ceremonies in the family, mother’s educational status, her knowledge, socio-economic status and the place of delivery, etc. The data from NFI (Gopujkar, 1984) showed that semi-solids were introduced earlier in cosmopolitan cities like Bombay and Madras and in other urban areas.
Hiwarkar et al. (1999) in their study in rural area of Nagpur observed that 67% of mother introduced weaning at 4-6 months of age while 17.0% at 6-12 months and rest of the 16% mothers started weaning after one year of age. Main reason for delay being lack of knowledge about supplementary food around 43% literate mothers weaned the child during 4-6 months of age while 74.6 mothers from illiterate group introduced supplementary food during 4-6 months of age. Statistical significance was associated between age of introduction of weaning food and literacy. Most of the mothers started weaning with dal (Pulse) water, rice water and gradually introduced semi-solid foods like mashed potatoes banana, khichari and then shifted to family food.

Chandrasekhar et al. (1995) reported in their study in rural Karnataka that 75.7% mothers felt that semi-solids must be started by 3-5 months of age. Nearly three-fourth (73.6%) of these mothers preferred to use ragi or gangi (rice gruel) as the first semi-solid food. A significant number of college educated mothers preferred ragi or gangi as 'finned food' when compared with the pre-literate.

Amuna P et al. (2000) find out in their study that, even in poor communities, it is possible to combine scant food resources in a cost effective way to formulate multi-mixes which would meet energy, protein and micro-nutrient needs without fortification. It is proposed that such approaches can be used in community nutrition education programmes to help reduce childhood malnutrition and in emergency feeding programmes.

Neela et al. (1995) carried out a cross-sectional study on 461 mothers (0-6 months lactation) attending teaching hospital of Hyderabad. Of these 197 were adolescent (age < 19 Yrs.) and the rest
were adults 86% were came from urban area and belonged to lower socio-economic group. They found that introduction of solid food supplements at 6 months was done in only 8.4% and adults mother respectively. Most of the supplements were cereal based.

**Mishra BK (1993)** in his study observed that, the age of introduction of solid food was common between 6-12 months. Only 14% of the industrial mothers and 5% of the urban mothers delayed the introduction of solid food beyond 12 months of age. There was no impact of parental education, per capita income, caste on introduction of solid food.

**Eppright et al. (1970 & 1972)** through a detailed report found that mothers nutrition knowledge, meal planning, food preparation, infant feeding permissiveness and attitude towards nutrition were found to be related to family traits and nutrient intake. The more a mother knew about nutritional facts the more likely she was to feel that nutrition was an important factor in deciding what to feed her family. Children with more optimum energy and nutrient intakes tended to have mothers with better knowledge about nutrition.

An article on infant nutrition *(Diary Council Digest; 1976)* reminds us that some clinical experts believe that early feeding patterns may play a role in the development of obesity, hypertension, arteriosclerosis and elemental retardation.

### 3. LITERATURE RELATED TO GROWTH & DEVELOPMENT

“Growth” is the gradual increase in size of the body and its organs “Development” is the increase in the numbers of skills performed by the body, including the brain and the performance of loose skills. Measuring a child’s growth is one way of measuring his attritional condition and general health.
According to WHO (1990), when a baby is born he weights about 3 kg, if he grows well, he will grow about 6 kg at 5 months of age and about 9 kg at 1 year of age. This means that healthy babies double their birth weight in five months. After that the increase in weight is not so fast, it remains only about 2 kg / year. Height is another measure of growth; at birth a baby is about 50 cm long whereas at 1 year of age he should about 72 cm. long. Height is a useful indicator of growth among older children. If a child is quite tall, but his weight is low he is thin or wasted. A malnourished child may also short or stunted.

Seth V et al. (1990) mentioned that comparison of percentiles of weight and height of NCHS and ICMR standard shows that 75th percentiles weight and height of the study were comparable with 80% and 90% of 50th percentile of NCHS respectively. Hence, upper 25% of same arranged in ascending order of magnitude were used for the construction of reference. Standards of weight and height comparison of percentile drawn from the top 25% of the sample demonstrated that 50th percentile of the NCHS for weight and 90% of 50th percentile of NCHS of the height for both boys and girls and also the 50th percentile of ICMR for weight and height for both sexes.

NCHS reference is widely used to compare the nutritional status of populations and to assess the growth of individual children throughout the World. But recently, concerns were raised regarding the adequacy of this reference.

Victora CG et al. (1998) mentioned that the current International growth reference- the National Center for Health Statistics (NCHS) thereafter the average growth of all infants, regardless of feeding pattern was faster than the NCHS reference until
approximately 65 months after which their growth became slower than that of the NCHS sample. To substantiate this finding the NCHS growth curves were then compared with growth data of breastfed infants in developed countries from pooled published studies formula–fed North American and European infants and predominantly bottle-fed US infants. In all three cases, weights, showed the same pattern as the Brazilian infants—higher than NCHS in the early months but an apparent decline thereafter. The pattern for length gain was similar but less marked. Breastfed infants showed more pronounced declines than those who were predominantly bottle-fed. These findings suggest that the infancy portion of the NCHS reference does not adequately reflect the growth of either breastfed or artificially fed infants.

Friesen H et al. (1998) reported in their study that the infants’ mean birth weight was 2516 gm. with weight < 2500 gm 70%, were small for gestational age (SGA) and 17% were premature. Infants’ growth rates were similar to those observed among breastfed infants in developed countries.

Chakaraborty & Shukla (1990) mentioned in their study that, the mean body weight of male infants was found 4.3, 6.3, 7.3, 8.8, kg and 4.2, 6.0, 6.9, and 8.5 among the female infants at the age of 0-3, 3-6, 6-9, and 9.12 months respectively. The mean body weight of male infants was found to be higher in all four groups as compared with that of female infants and this trend was similar to ICMR standard.

Maheshwari & Jain (1999) conducted a study on infants of 6-12 months age group on 120 ICDS beneficiaries at Udaipur (Rajasthan) with equal representation from rural and urban area. The rural infants were lighter than the urban infants but the difference was not statistically significant (P>0.05). The overall mean weight of the study
group was 6.68 kg representing 76.23%. As per IAP classification 68.4% infants were suffering from various grades of malnutrition. However, mild to moderate degree of malnutrition was more prevalent as compared to severe form in both areas. The mean length of both groups was 63.27 ±0.037 cm. The mean length percentages of NCHS for urban and rural infants were 89.58±0.64 and 88.2±0.49 m respectively. The mean weight for length of urban and rural areas was 102.3%. In urban 26.7% and 24.7% in rural area infants had weight/length more than 100% of NCHS standard. This classification of weight for age i.e., McLaren and IAP were used to assess the malnutrition among the study group. The McLaren Classification indicates 90% infants as malnourished in comparison to 70% by IAP classification. Seventy percent infants were suffering from various grades of malnutrition. But severe form of malnutrition was prevalent only between 2 to 7% infants.

Dewey KG et al. (1995) demonstrated in their study that in comparison with WHO reference data, infants breastfed for at least 12 months grew more rapidly in the first 21 months and less rapidly from 3 to 12 months; mean z score at 12 months was – 0.32 for weight for length. In contrast mean head circumference was well above the WHO median throughout the first year of life.

Neela et al. (1994) studied the relation between types of feeding and grades of malnutrition following Gomez classification. In exclusive breastfed infants 78.4% were normal and only 21.5% were malnourished whereas not much of difference observed in respect to the distribution of normal (64.6 and 67.6%) and malnourished (35.5 and 32.4%) infants in PBF and NBF information respectively. At any given point the majority of infants were in normal nutritional grades
(about 75% weight for age) with only a small percentage of infants in Grade II malnutrition increased. There was not a single infant with Grade III malnutrition in any group.

Some of the investigators (Buzina, 1974) used a weight for height ratio (relative body weight) as an age independent index of body-build with the suggestion of a body-mass index of weight/height, which attempts to estimate body-mass. The index is highly correlated with weight and relatively independent of height. Jelliffe (1966) conclude that as a measure of nutritional status low weight for height is indicative of recent severe mal-nutrition while both low weight and height measures indicate long-standing malnutrition. He has suggested the use of chest/head circumference ratio as an indicator of nutritional status. But as per Jelliffe (1966) & Mc Laren (1972) there is controversy on the use of this index.

Dugdale’s Nutritional Index (1974) offers the advantages of being relatively easy to measure and is age-independent. This index is based on a power relationship between Weight (in kilogram) and height (in centimeters).

The index between height and weight are calculated by the equation.

\[
\frac{\text{Weight (Kg)}}{\text{Height (Cm)}^{1.6}} \times 10^4
\]

Children are classified as malnourished if their nutritional index value is 88 or below (corresponds with third percentile of Stuart Stevenson series). A nutritional index of 110 or above would signify obesity (corresponds with ninety seventh percentile in Stuart Stevenson series).
An investigation by Stine et al. (1967) attempt to derive on index of health from body measures. He compared the means of various measures in coefficient of correlation and found that height and weight were the most correlated of the measures. Also correlated were height and age and weight. He concluded that one measurement alone is not a sufficient index of health.

For a number of scholars (Johnson et al., 1981; Frisancho, 1984; Vijatayaghavan, 1987) the Anthropometric measurements have become an indispensable approach of evaluation of nutritional status of children and adult. Many measures are currently being used to determine the nutritional status among children.

Among the measures in use are height, weight, weight/height and power variations of the relationship, various body circumferences and various skin folds or fat folds. Perhaps the simplest and most commonly used of these measures are height and weight (Expert Committee on Medical Assessment, 1963; Jelliffe, 1966).

Height is a measure of growth and poor or inadequate nutrition might be indicated by failure to increase height appropriately. For a long time researchers believed that growth potential was strictly a genetic function. There is now abundant evidence that genes may set the limits for a person’s potential size, but it is ultimately determined by a complex of factors inclined by different factors including intrauterine development, nutrition extra-uterine development, socio-cultural condition activity, energy expenditure stress, illness, sex, birth and order & stimulation from the environment. An insult in any of these areas might affect a child’s growth (height and weight). Accordingly, Jelliffe (1966) and Brannon (1977) have concluded that growth or lack of attaining certain growth parameters is thus a screening tool of
determining children at greater risk of having nutritional insult, rather than being a diagnostic total for direct assessment of inappropriate nutrition. Weight is also a measure of growth, which is more sensitive indicator than height in respect of child’s health situation. It is quite sensitive to current calorie intake. It influenced by many factors like height, frame size proportion of fat, muscle and bone, pathological edema and environmental factors.

Kumar et al. (1997) conducted their study at 2 ICDS Blocks of Varanasi and recorded anthropometric measurements for weight, length head chest and mid arm circumference, within 24 hours of birth and then at 3,6,9 and 12 months of age. As study shows the mean weight for boys as well as of girls recorded at above intervals of age was slightly better in ICDS block in comparison to non ICDS area. The overall patterns of growth of infants in both the ICDS blocks were poor, particularly, in the later part of infancy.

Hypotheses :

1. Breast-feeding is wide spread in all the communities.
2. Introduction of pre-lacteal feed and rejection of colostrums are commonly practiced in most of the families.
3. Social, factors like education of mother, economic status, caste, etc, also influences the pattern of infant feeding.
4. Feeding practices among rural and urban communities are different.
5. Growth and development of the child depends upon the feeding practices like duration of exclusive and total breast-feeding, introduction of supplementary feed etc.
Review of Literature