NUTRITIONAL STATUS AND FEEDING PRACTICES OF CHILDREN FROM BIRTH TO 15 MONTHS IN RURAL AREA OF NORTH WEST FRONTIER PROVINCE PAKISTAN

A HAMEED AND P I PARACHA

Department of Paediatrics and Department of Human Nutrition, Khyber Medical College and Agricultural University, Peshawar.

SUMMARY

A community based study was conducted to assess the growth of children from birth to fifteen months in North west Frontier Province (NWFP), Pakistan. The initial anthropometic measurements and feedings history of the babies were recorded within twelve hours of the delivery which were followed by three monthly intervals for a period of fifteen months. On hundred and ninety children were followed longitudinally for taking their weight, height and feeding history. Thirteen percent of the babies were found to be low birth weight (<2.5 kg). Mean weight for age Z score (WAZ), height for age Z score (HAZ), and weight for height Z score (WHZ) of the newly born babies were 0.52, -0.10 and –0.99, respectively, however, by fifteen months the WAZ, HAZ, and WHZ had dropped to –1.74, -1.77 and –0.86, respectively. The prevalence of acute and chronic malnutrition assessed by using arbitrary cutoff values of < -2 WAZ (underweight), < -2 HAZ (stunted) and < -2 WHZ (wasted) showed that at birth 5.3% of the babies were underweight, 3.2% were stunted and 11.1% were wasted. The percentage of children falling into these categories of malnutrition increased with age so that by fifteen months 40% of boys and 33.3% of girls were underweight, 33.3% of boys and 22.2% of girls were stunted and 20% of boys and 11.% girls were wasted. The anthropometric results suggest that during first six months, growth of the Pakistan infants was comparable to that of the corresponding age reference infants. The fall of in their growth trajectory getting progressively worse after six months possibly due to poor weaning practices or increased episodes of recurrent child's illnesses or a combination of both.

INTRODUCTION

Anthropometric measurements are noninvasive tools for assessing the nutritional status of young children. Weight and height during the early years of life are the core measurements of growth and development. Although a deficit in growth is not the most sensitive indicator of nutritional status, it is widely accepted and very practical way of assessment. The first effect of malnutrition can be measured as a loss of weight due to short term effect of infections and or poor nutrition while slowing and stopping of linear growth is influenced by more long term effect of chronic infections and or poor dietary intake.[1,2] Therefore, measurements are sensitive to pathological and nutritional insults and provide valuable information on the present and past state of the child's health. Weight for age height for age and weight

for height are the most commonly used indicators of nutritional anthropometry and are more useful when compared to reference or local standards.

Malnutrition among preschool children is one of the major health problems in Pakistan and despite economic progress, there has been little improvement in the prevalence of malnutrition or in the morbidity and mortality of this group.[3] Pakistan is classified as a country with very high under five mortality rate, 136/1000.[4] in contrast, Sri Lanka whose per capita income is slightly higher than Pakistan.[4] Diarrhea and acute respiratory infections are the two leading causes of childhood morbidity and mortality with an estimated figure of about 500,000 deaths each year from these two disease.[5]

A number of studies[6-11] conducted around the world revealed and inverse relationship between anthropometric measurements and childhood morbidity and mortality. Growth faltering which begins early in the life of Third Worlds infants, results in an increased child's susceptibility to infections and also impedes physical, mental and psychomotor developments.[12,13] However, there are very limited data on the growth and nutritional status of Pakistani children. Therefore a longitudinal growth study during infancy in rural area of NWFP was set up to :I examine the growth pattern of preschool children: II quantify the degree of malnutrition: and Iii study the feeding and weaning practices of the families.

MATERIAL AND METHODS

A study was carried out in Aza Khel Bala, district Nowshera, about 30 kilometers, North East of Peshawar, NWFP, Pakistan. The village was selected in preference to others because of the willingness of the paramedical staff of the mother and Child Health Centre (MCHC) run by the Red Crescent Society of Pakistan, to assist in the study. The team, a research fellow, a lady health visitor (LHV) and traditional birth attendants (TBAs) were responsible for the anthropometry and for collecting dietary information.

A training manual on anthropometry was developed in the national Pakistani language, Urdu.[14] using this manual, the field staff were trained to take anthropometric measurements. The accuracy and reliability of the observes in taking anthropometric measurements were monitored by the procedures recommended by the World Health Organization.[15] The staff were also trained in interviewing techniques used for completion of dietary and socioeconomic questionnaires. The questionnaires were pretested on a group of women other than the study population. Necessary changes were made to the questionnaires to be used in the study following the analysis of the pretested questionnaires.

TABLE – I

ANTHROPOMETRIC MEASUREMENTS OF NEWLY BORN BABIES

Variables	Boys (N=96)	Girls (N=94)	Ttal (N=190)
Weight (kg)	3.06 ± 0.42	2.96 ± 0.20	3.02 ± 0.36
Height (cm)	50.19 ± 2.09	49.71 ± 1.60	49.95 ± 1.87
Weight-for-age Z-score	-0.54 ± 0.98	-0.51 ± 0.60	-0.52 ± 0.81
Height-for-age Z-score	-0.13 ± 0.91	-0.07 ± 0.74	-0.10 ± 0.83
Low Birth Weight Babies (< 2.5 kg)	16%	10%	13%

TABLE – II

PREVALENCE OF MALNUTRITION IN CHILDREN FROM BIRTH TO 15 MONTHS

Age (months)	Weight-for-Age Z-score <-2			Height-for-Age Z-score <-2			Weight-for-Height Z-score <-2		
	Boys (%)	Girls (%)	Total (%)	Boys (%)	Girls (%)	Total (%)	Boys (%)	Girls (%)	Total (%)
Birth	9.4	1.1	5.3	4.2	2.1	3.2	13.6	8.3	11.1
Three	10.7	5.0	8.3	17.9	10.0	14.6	7.1	5.0	6.0
Six	14.3	9.1	12.3	14.3	4.6	10.5	5.7	4.4	5.0
Nine	24.1	18.8	22.2	17.2	6.3	13.3	10.3	6.3	8.9
Twelve	36.8	22.2	32.1	31.6	22.2	28.6	9.9	5.7	8.1
Fifteen	4.0	33.3	37.5	33.3	22.2	29.2	20.0	11.4	16.7

In rural areas, majority of the deliveries take place at home where local TBAs supervise the birth. The TBAs were asked to inform the LHV at the MCHC in Aza Khel Bala of the births in the area. The LHV then explained purpose of the study to each mother and informed consent was obtained from those willing to take part.

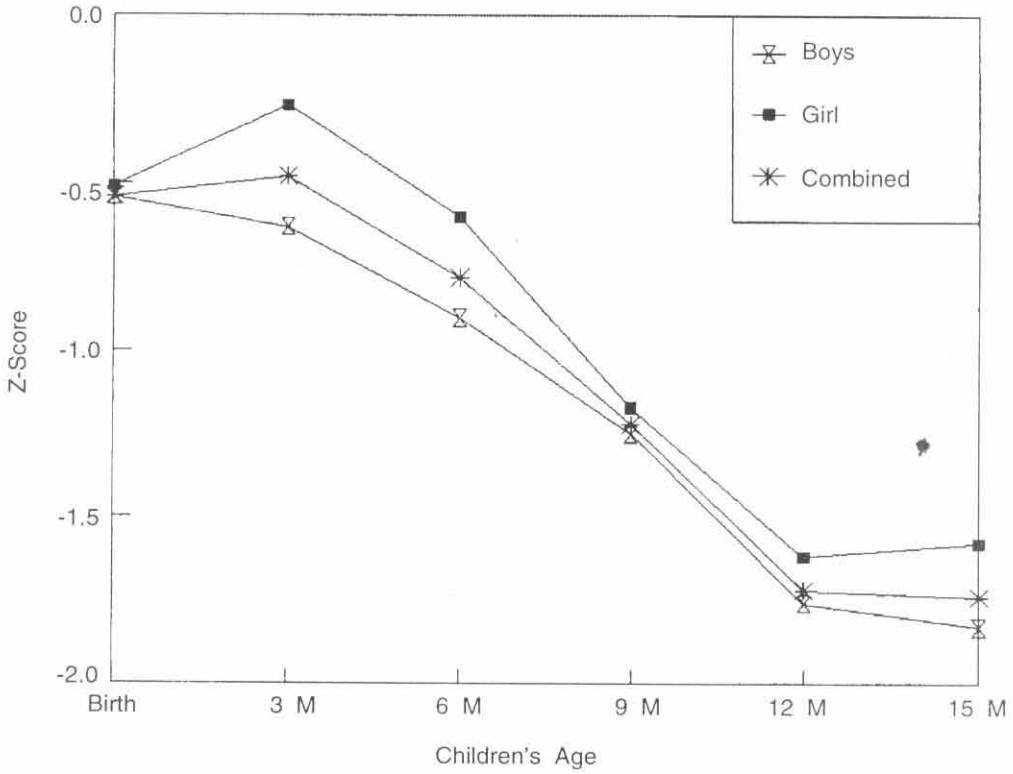

Figure 1: Weight-for-Age Z-score

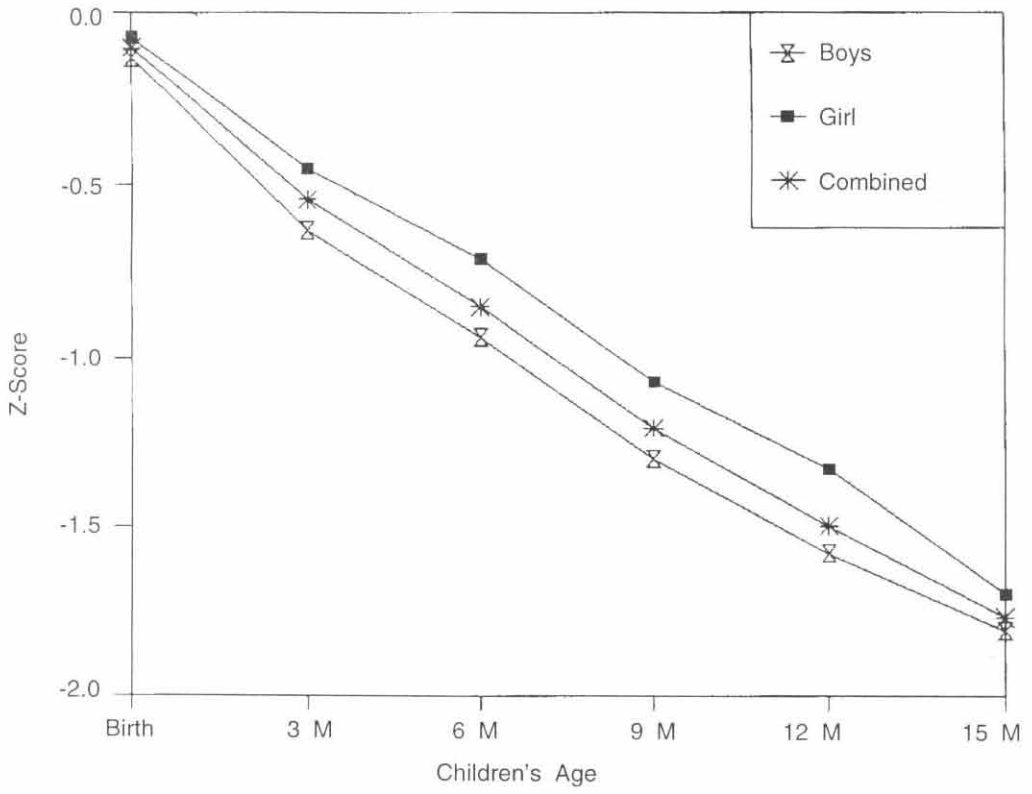

Figure 2: Weight-for-Age Z-score

Weight and height of the newly born babies dressed in a light clothing were taken within twelve hours of the delivery following the standard anthropometry procedures.[15] Two hundred and eighteen babies were enrolled, of which four baby's parents moved to other towns, six baby's parents refused to participate and eighteen died during the study period. One hundred and ninety children were followed longitudinally for taking their weight and height at an interval of three months during first fifteen months. Mothers were interviewed using the structured questionnaires to assess feeding and weaning practices. The information was recorded on computer for analysis.

The weight and height data were analyzed using the nutritional anthropometry module of Epi info.[16] The use of the software enabled us to compare the weight and height of the study infants to the NCHS standards.[1] WAZ, HAZ and WHZ were calculated and usual cutoff value of <-2 Z-score (Z) was used to classify children into underweight (weight-for-age <-2 Z), stunted (height-for-age <-2 z) and wasted (weight-for-height <- 2 z). Descriptive statistics (stem and leaf, boxplot and frequency) were used to assess the distribution and comparison in means between the variables.[17,18]

RESULTS

Anthropometric Measurements

Table-I shows the anthropometric measurements and Z-scores of the newly born babies. The results revealed that at birth the baby boys had a lower weight for age and height for age Z-scores than those of the baby girls. The percentage of low birth

TABLE – III

FEEDING AND WEANING PRACTICES OF MOTHERS

Variable	Type	Number	Percent
Day of initiating Feeding	Day 1	110	57.9
	Day 2	61	32.1
	Day 3	19	10.0
Type of Feeding at Birth	Breast Milk	35	18.4
	Ghutti	118	62.1
	Honey/green tea/herb/anised water	37	19.5
Feeding during first three months	Exclusively Breast Feeding	155	81.6
	Partial Breast Feeding	35	18.4
Feeding during 4-6 months	Exclusively Breast Feeding	121	63.6
	Partial Breast Feeding	69	36.4
Feeding during 7-9 months	Exclusively Breast Feeding	85	44.7
	Partial Breast Feeding	105	55.3
Feeding during 10-12 months	Exclusively Breast Feeding	42	22.1
	Partial Breast Feeding	148	77.9
Feeding during 13-15 months	Exclusively Breast Feeding	16	8.4
	Partial Breast Feeding	174	91.6
Complementary Feeding Introducing Month	4-6 Months	69	36.3
	7-9 Months	36	19.0
	10-12 Months	43	22.6
	13-15 Months	26	13.7
	Not known	16	8.4

weight babies and prevalence of malnutrition was also found to be higher in boys than girls. Weight for age and height for age Z-scores of the children tended to decrease with increase in age falling to –1.74 and –1.77 respectively, by fifteen months of age (figure I-II). Weight for height Z-score of the infants increased after birth until six months and then decreased in a continuous fashion (figure-III). The deficits were greater in boys than those of the girls.

The growth velocity of children shown in figures 4 and 5 indicate that the children grew rapidly during the first six months, however, subsequent to this there was a substantial fall of in weight and height increments. The prevalence of acute and chronic malnutrition assessed by using arbitrary cutoff values of ,-2 WAZ (underweight), <-2 HAZ (stunted) and <- 2 WHZ (wasted) showed that at birth 9.4% of boys and only 1.1% of girls were underweight, 4.2% of boys and 2.1% of girls were stunted and 13.6% of boys and 8.3% of girls were wasted. The percentage of children falling into these categories of malnutrition increased with age so that by fifteen months 405 of boys and 33.35 of girls were underweight, 33.3% of boys and 22.2% of girls were stunted and 205 of boys and 11.4% of girls were wasted (table-II).

Feeding and Weaning Practices

Feeding history of the babies revealed that 57.9% of mothers fed their babies on the first day, 32.1% of the mothers on the

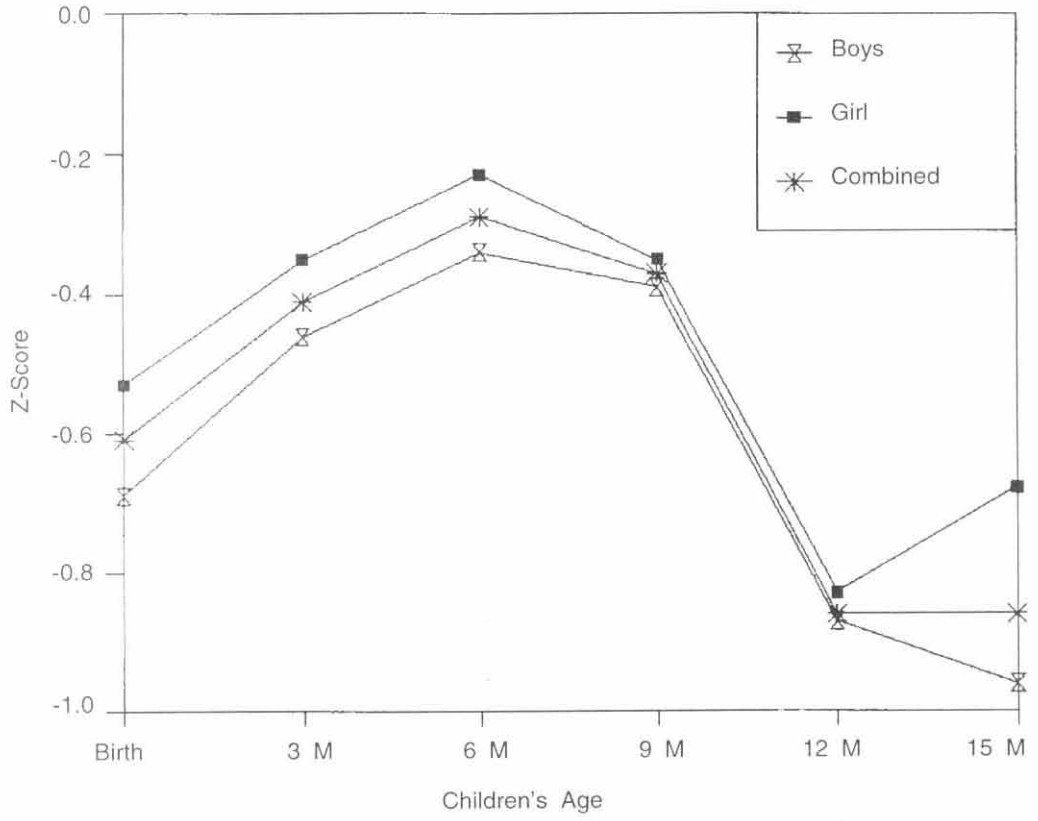

Figure 3: Weight-for-Age Z-score

second day and 10% of the mothers on the third day following the birth of their baby. Although majority of the mothers breast fed their babies many babies were deprived of colostrum due to the delay in giving the first feed. The data showed that only 18.4% of the mothers gave either boiled water, green tea, honey or herb water as a starting food to their babies (table-III).

During the first three months, 81.6% of the babies were exclusively breast fed. This figure had dropped to 63.3% by six months then to 44.75, 22.1% and 8.4% at nine, twelve and fifteen months, respectively (table-III). Data regarding introduction of solid food to the infants revealed that 36.4% of the women introduced solid food to their infants between the age of four to six months, 18.9% at the age of seven to nine months, 22.6% ten to twelve months and 13.7% of the women introduced slid food to their infants between the age of thirteen to fifteen months (table-III). The data on the type of solid good given to the infants showed that 38.9% of the mothers gave bread to the infants as a first solid food while 53.6% of the mothers gave family foods such as fruit, biscuits and cooked potatoes. Commercial weaning foods or specially prepared home food such as custard, cooked rice, cecrelac and farex were given by only 7.5% (table-III).

DISCUSSION

Anthropometric Measurements

Growth during childhood is influenced by a variety of environmental factors

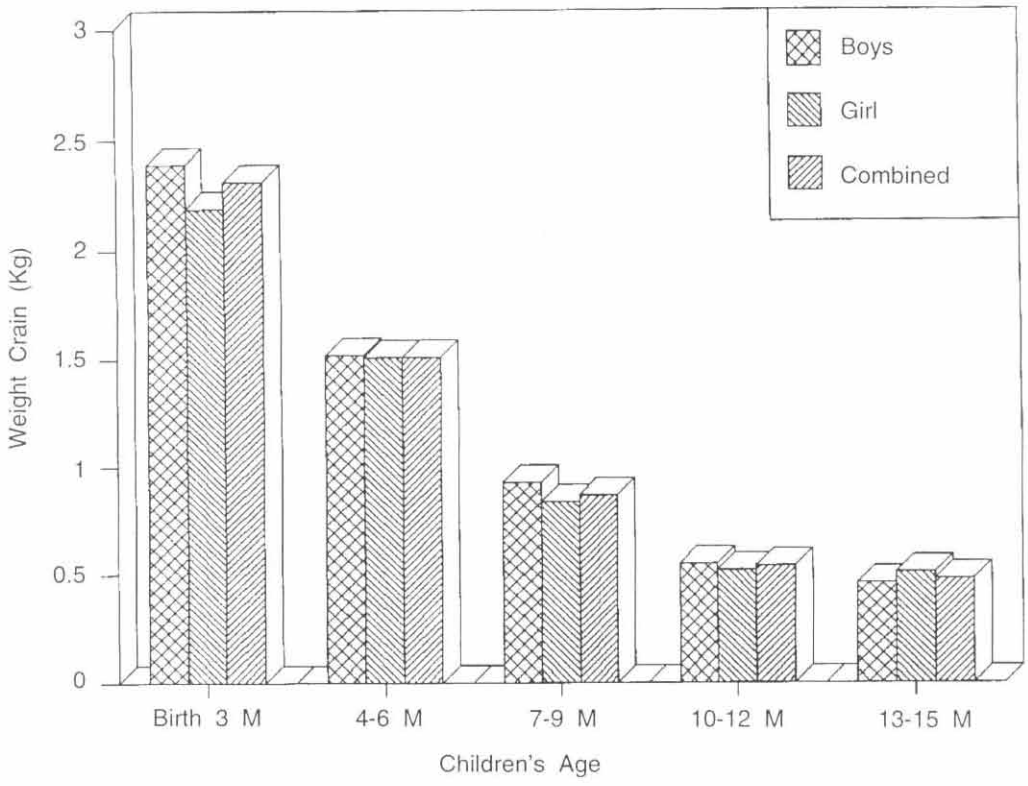

Figure 4: Growth Velocity (Weight Gain of Children)

ranging form dietary to socio economic status of families. These factors vary from one place to another and so do the growth rates of children. Growth velocity during childhood may be used as an indictor of child's health and its surrounding environment. Initial anthropometric measurements revealed that majority of the babies had birth weights greater than 2.5kg, however, 13% of the infants were of low birth weight which may reflect the poorer nutritional status of their mothers.

The birth weight and height of the neonates in this study were similar to those found in other studies conducted in Pakistan.[19,21] However, the prevalence of low birth weight babies in the studied population (13%) and the reported national figure of 25%.[23] The smaller number of babies with low birth weight seen in this study may be attributed to the presence of the maternal child health centre where mothers used to visit for regular checkups and to receive supplements and advice.

The first six months of life are a time of rapid growth and the infants in this study grew relatively better in the first six months, however, growth was found to be lower when compared to that of the reference population.[24] the difference in anthropometric measurements between the study population and NCHS reference values increased with child's age. Similarly, the prevalence of malnutrition also increased with increasing child's age. The most probable reasons of increasing deficits in child's growth with increasing age may be due to increased body's nutrient demand and decreased dietary intake partly to inappropriate feeding and weaning practices. These results corre-

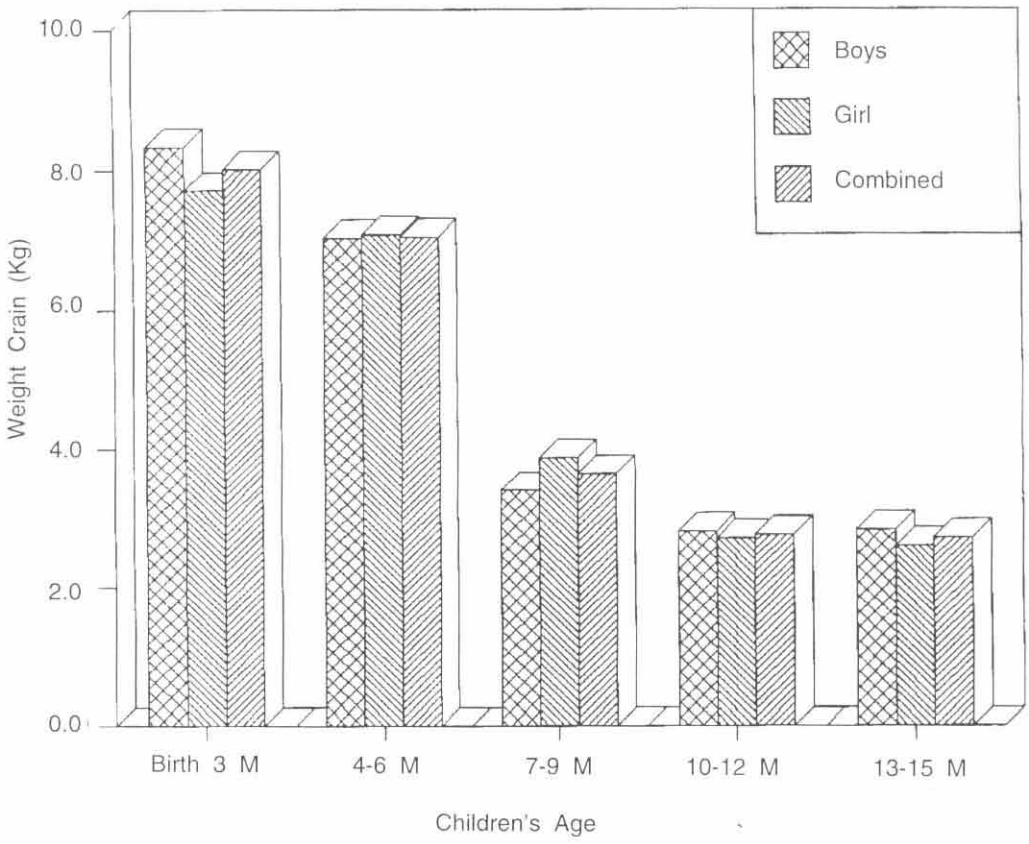

Figure 5: Growth Velocity (Height Gain) of Children

spond with those of Karlberg et al.[20] who conducted a longitudinal growth study on infants from different areas of Lahore, Pakistan. The found that growth faltering began at about six months of age and continued until 18 months of age when growth seemed to stabilize. Nagra and Gilani[25] and Nagra et al.[19] also reported somewhat similar anthropometric results on infant's growth during first year of life. The observed growth velocity figures for the Pakistani infants are also in fair agreement with the reported figures of waterlow[26] for the infants of less developed countries. Differences in rates of physical growth and development between populations may be accounted for by variations in environmental surroundings.

The Z-scores on anthropometric measurements revealed that the boys were more acute and chronic malnourished than those of the girls. Weight for age and height for age were found to be more sensitive and useful indicators of assessing malnutrition in infants. Conversely, weight for height was found to be an insensitive indicator where infants were both underweight and stunted, resulting in normal weight for height values. The implications of becoming malnourished during the early years of life are devastating to the extent of not only increasing childhood's morbidity and mortality but also impairing behavioural and cognitive functions. It has been reported[27] that deficits in anthropometric measurements were responsible for 205 to 755 of all child deaths and

that even mild to moderate (60-80% of the median weight for age) malnutrition was associated with 33% to 80% of nutrition related deaths. Mortality in Ugandan low weight for age and weight for height infants was found to be many fold higher than those with normal anthropometric measurements.[28]

Baqui et al.[29] found a strong association between anthropometric indictors and morbidity in Bangladeshi children. They reported that the children. They reported that the children with weight for height Z-score <-2 had 3.5 times increased risk of persistent diarrhea as compared to their counterparts with zero weight for height z-score i.e. mean weight for height Z-score approximated to reference mean weight for height. Higher mortality was also found among Indian children who were either both stunted and wasted or only stunted or easted.[30] association between low anthropometric indicators (weight for age, height for age and weight for height) and increased children mortality was also reported in a number of other studies.[31-33]

Feeding and Weaning Practices

There was a general consensus among the mothers of the study population that breast milk is the best food for infants. However, most of the mothers still give pre lacteal food to their babies before initiating breast feeding because they believed it cleaned the stomach of the baby. The delay in breast feeding not only deprived the babies of nutritionally and immunologically rich colostrum but also starved them for up to three days. This practice of pre-lacteal feeding is not universal throughout Pakistan, in one study[25] 89% of the mothers gave colostrum to their babies within six hours of postpartum while in another study[34] it was found that only 4 -15% of the newly born babies received breast mil in the first twenty four hours after birth. The delay in initiation of breast feeding is due to ignorance and the influence of elder women who have an authoritative role in extended families.

Exclusive breast feeding in underprivileged communities in developing countries during the early months of infant's life may benefit the child from reduced incidence of morbidity and mortality form diarrhoeal disease. However, for every breast fed child there comes a point when breast milk alone can no longer fulfil the infants nutritional needs. This point has become known as weanling dilemma i.e. when is the right time to introduce weaning or supplementary foods? If weaning foods are withheld beyond the fourth to sixth month of life, growth faltering occurs due to inadequate nutrition but at the same time serving contaminated and unhygienic foods to the infant increases the risk of morbidity. In this study, [25] of the mothers exclusively breast fed their infants for the first three months of life, subsequent to this there was a gradual decrease in exclusible breast feeding until at 13-15 moths only 8% of the infants were still exclusively breast fed. In another stusy[25] more than 90% of the infants were initially breast fed irrespective of their socio economic status, however, by three moths breast feeding declined to 40% and by six months only 3.3% of infants were exlusively breast fed.

The term weaning tends to mean the addition of semi-solid and solid foods to a breast or formula fed infant. About a third of mothers introduced weaning foods into the diet of their infants between four and six months and by nine months just over half the infants were receiving weaning foods. Although most of the mothers introduced weaning foods to their infants at the right time, the quality and choice of foods may not have been ideal for adequate growth. Bread was being used as a sole weaning food by 38.9% of the mothers, this would not have been nutritionally adequate nor would it inspire the child's appetite. About half the mothers gave those foods to their

children which were either prepared or bought for the whole family i.e., cooked food and fruit while only 1.6% of the mothers were able to afford to use commercial weaning foods. The results on feeding and weaning practices of the present study were in line with those of earlier researcher[19,21,36] who reported that about 50% of the mothers gave solid food to their babies at the age four months and that quality of weaning foods given to the infants was inferior in lower socio-economic families.

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