



## Growth and Development of Twelve-Month Infants in Central Malatya, Turkey+

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**Objective:** This cross-sectional study was carried out to assess the growth and development of twelve-month infants in the city of Malatya and the relationship of this to mothers' knowledge of growth and development.

**Methods:** Healthy infants (260) born in March 1997 and living in the city of Malatya were included to the study. Data were collected from mothers during March 1998 by researchers' trained assistants using questionnaires as well as by measurement of growth. Data were analyzed by rates and chi-square.

**Results:** With respect to weight, 3% of the girls were under the 3% percentile while 0.7% of the boys were under the 3% percentile. Length measurements indicated that 1.5% of the girls were under the 3 percentile and 1.6% of them were under the 3% percentile. Mothers who were informed about baby growth and development were compared to those who were not. Results showed that 58% of informed mothers and 40% of non-informed ones took their babies for routine health checks ( $p<0.05$ ). The evaluation of growth and development of the infant is essential for nursing applications.

**Key Words:** Growth-development, Infants, Nursing

### Malatya İl Merkezinde 12 Aylık Bebeklerin Büyüme-Gelişmesi

**Amaç:** Malatya il merkezinde 12 aylık bebeklerin büyüme gelişme durumlarını ve annelerin büyüme gelişme bilgisiyle ilişkisini saptamak amacıyla yapılan kesitsel bir çalışmadır.

**Metot:** Araştırmanın evrenini, Malatya il merkezinde yaşayan ve 1997 Mart'ta doğmuş (260) sağlıklı bebekler oluşturmaktadır. Veriler 1998 Mart ayı boyunca büyümenin ölçülmesiyle olduğu kadar, anket formu kullanarak, eğitilen araştırmacılar tarafından annelerden toplandı. Veri oranlar ve ki-kare ile analiz edildi.

**Sonuç:** Ağırlığına göre erkeklerin %0.7'si %3 persantilin altındayken kızların %3'ü %3 persantilin altındaydı. Boy ölçümleri kızların %1.5'i %3 persantilin altında olduğunu gösterdi ve erkeklerin %1.6'sı %3 persantilin altındaydı. Bebek büyüme gelişmesi hakkında bilgisi olan annelerle olmayanlar karşılaştırıldı. Sonuçlar bilgili annelerin %58'i ve bilgili olmayanların %40'ının bebeklerini rutin sağlık kontrolü için getirdiğini gösterdi ( $p<0.05$ ). Bebeklerin büyüme ve gelişmelerinin değerlendirilmesi hemşirelik uygulamaları için gereklidir.

**Anahtar Kelimeler:** Büyüme-gelişme, Bebek, Hemşirelik

+ The study was sponsored by research fund number 97/20 from İnönü University.

This study has been presented as poster report in 44<sup>th</sup> National Peditry Congress (4-8 September 2000, Bursa-Turkey).

## INTRODUCTION

A healthy infant is described as an infant who has no symptoms of illness, and has appropriate growth, physiological maturation and intelligence growth according to chronological age.<sup>1</sup> With the follow-up of infants' health, it is possible to enable infants to reach their optimal genetic growth potential, and live a longer, healthier and more productive life.

In Turkey, follow up of growth is applied in all provinces as routine primary health care.<sup>2</sup> Infants are brought in by their mothers for routine health care. When a complicated case occurs which is impossible to provide for in the primary health organizations, they are transferred to a suitable health organization such as a

hospital, so that these children can reach their optimal growth potential.<sup>2,3</sup>

The evaluation of growth and development of the infant is essential for nursing applications. By doing so, we can determine ways to protect against already existing difficulties, and predict probable outcomes.

## METHODS

This study was conducted in the city of Malatya, Turkey, to evaluate the growth and development of infants at the age of twelve months and to examine how the mothers' knowledge about the growth and development of infants affected their decisions on taking babies with no apparent illnesses to routine health checks.

**Başvuru Tarihi: 19.01.2007, Kabul Tarihi: 24.09.2008**

The study is a cross-sectional survey. The sample consisted of healthy infants born in March 1997 in the city of Malatya.

Data regarding the number of infants born during the month of March 1997 were collected from a retrospective review of Home Medical Charts in the local medical centers of the city. The number of infants was 289, but 30 were excluded from the study – 18 from families who had moved to other cities and 12 who were not found because of incorrect addresses. The ratio of those included in the study was 89.9%. Questionnaire forms, developmental outcomes, and measurements of the 12-month-old infants were used. The questionnaire form was developed as a data obtaining technique from the literature associated with the subject.<sup>1,4,5-9</sup> It was administered by interview, and there were 36 questions about familial type, growth and development of the infants, and the mothers knowledge about it.

The study was carried out by experienced female questioners from the Government Statistical Institution, who had been trained and divided into two groups. Staff of Mother and Child Care Centers and Health Centers were not included in the study in order to ensure impartiality. The questioners were trained how to measure the body length and weight, head and chest circumference, and what they should pay attention to when they assessed the growth and development of infants at 12 months of age.

The measurements were conducted using a standard hand scale and a standard steel tape to assess growth and development of the infants. Babies were measured with only their underwear on. First, the mother was asked the questions on the form after consent was obtained, and then the data were collected by measurement, as mentioned above, by screening them and by applying these criteria.

The questions in the form were evaluated and grouped. The growth parameters (body length, weight and head circumference) of infants at 12 months of age were evaluated using growth percentile curves developed by Neyzi et al.<sup>10,11</sup>

Data were computerized, using the statistics program SPSS for Windows, and evaluated using defining statistics and chi-square. Mean arithmetic values in the study were shown as standard deviation.

The data obtained from the health centers mentioned above were accepted as true.

## FINDINGS

The families participating in the study divided into two groups: nuclear families, 79.2%, and large ones, 18.5%. The age distribution of mothers was as follows; 29.2% were 25-29 years old, 28.8% were 20-24, and 26.5%

were 30-34. While 58.1% of mothers were educated only at primary schools and 20% had no education at all, 15.8% had a secondary-school education. 45.4% of fathers were educated at secondary school, 39.2% at primary school, 10.8% at a university, and 4.6% had no education at all, that is, they were illiterate.

The regions where the 88.8% of families live are urban areas. When the number of persons in the family was observed, 45% were quite large families with 5-8 members. When we studied the number of children within the families, the number of families with 6 or more children was 6.1% while 31.2% had 2 children, 25% had 1 child, and 19.2% had 3 children.

When the social security situations of the families were investigated, it was seen that 29.6% had no social security and the rest belonged to one of the two current social security systems in Turkey.

While 133 children (51.2%) in the study were girls, 127 (48.9%) were boys. The number of infants taken for health checks before any sign of disease was 127 (48.9%), and 133 (51.15%) were not taken. Among these infants, 74% were taken to Health Centers, 11% to physicians' offices, and 7.1% to hospitals.

The percentile assessment of measured body weight, length and head circumference of 12-month infants can be seen in Table 1-3. Chest circumferences of the 12-month-infant girls were  $48.1 \pm 3.0$  cm, and those of the boys at the same age were  $48.8 \pm 3.0$  cm.

When mothers were asked in which month their babies grew their first tooth, girls grew it at  $8.35 \pm 2.0$  months, and boys at  $8.27 \pm 1.9$  months. Regarding the number of teeth at 12 months, the number was  $4.33 \pm 2.1$  for girls and  $4.71 \pm 2.1$  for boys.

## DISCUSSION

Infections cause reluctance in feeding, and changes in metabolism and behavior. These changes increase the need for nutrition in the body. The way infants are fed and the way in which they eat are affected by this.<sup>12</sup>

Infectious illness was prevalent in the sample. It was found that in the past years 56.7% of them had had respiratory disease, 16.4% diarrhea, 11.2% chicken pox and 6% otitis. Among these, circulatory disease and diarrhea are primarily responsible for mortality in our country. Infections, especially those experienced within the first year, are the leading factors that affect the growth and development of infants. It is important to tell parents about infant diseases and protection methods. For example, chicken-pox is likely to occur, but it can be prevented by vaccination.

Certain values may occur as a result of certain feelings given importance by societies. A medical technician can

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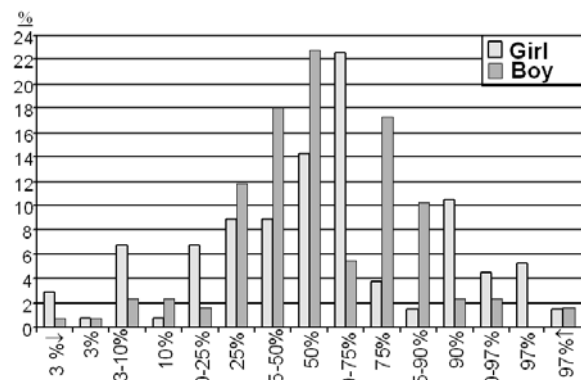
make positive changes in health care by being aware of these social values.<sup>13</sup>

With regard to the first feeding of infants in the 24 hours after birth, 196 (75.39%) were breast-fed, 55 (21.15%) were given sugared water, 2 (0.77%) water, 2 (0.77%) formula, 3 (1.15%) other nutrients, while 1 was given persimmon, 1 watermelon, 1 cow's milk and two (0.77%) were not fed. In the study by Öztürk and Özçelik (1997), 71.4% of the infants were breast-fed and 22.3% were given sugared water in the first feeding.<sup>14</sup> These findings are similar those in this study.

232 (89.24%) of mothers gave their infants colostrum and 28 (10.76%) did not. When mothers who did not give colostrum were asked the reason, 2 (7.14%) of them stated they did not do so because of poor nipples, 2 (7.14%) because of breast pain, 6 (21.43%) because they had insufficient milk, 2 (7.14%) because the baby was in an incubator, 7 (25.00%) because of insufficient suckling, 7 (25.00%) because they considered it to be a

**Table 1.** Percentile distribution according to body weight of 12-month-old infants.

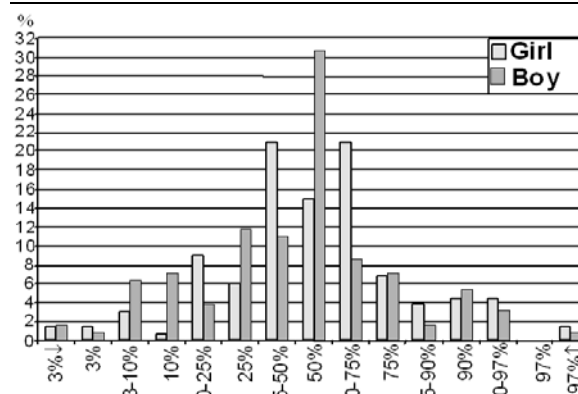
Percentile (%)	Girl		Boy		Total	
	n	%	n	%	n	%
<3	4	3.0	1	0.7	5	1.9
3	1	0.7	1	0.7	2	0.8
3-10	9	6.8	3	2.4	12	4.6
10	1	0.7	3	2.4	4	1.5
10-25	9	6.8	2	1.6	11	4.2
25	12	9.0	15	11.8	27	10.4
25-50	12	9.0	23	18.1	35	13.5
50	19	14.3	29	22.8	48	18.5
50-75	30	22.6	7	5.5	37	14.2
75	5	3.8	22	17.3	27	10.4
75-90	2	1.5	13	10.2	15	5.8
90	14	10.5	3	2.4	17	6.5
90-97	6	4.5	3	2.4	9	3.5
97	7	5.3	--	--	7	2.7
97 ↑	2	1.5	2	1.6	4	1.5
<b>Total</b>	<b>133</b>	<b>100</b>	<b>127</b>	<b>100</b>	<b>260</b>	<b>100</b>



**Figure 1.** Distribution of body weight of 12-month-old infants.

**Table 2.** Percentile distribution according to body length of 12-month-old infants.

Percentile (%)	Girl		Boy		Total	
	n	%	n	%	n	%
<3	2	1.5	2	1.6	4	1.5
3	2	1.5	1	0.8	3	1.1
3-10	4	3.0	8	6.3	12	4.6
10	1	0.7	9	7.1	10	3.9
10-25	12	9.0	5	3.9	17	6.5
25	8	6.0	15	11.8	23	8.8
25-50	28	21.1	14	11.0	42	16.2
50	20	15.0	39	30.7	59	22.7
50-75	28	21.1	11	8.7	39	15.0
75	9	6.8	9	7.1	18	6.9
75-90	5	3.8	2	1.6	7	2.7
90	6	4.5	7	5.5	13	5.0
90-97	6	4.5	4	3.1	10	3.9
97	--	--	--	--	--	--
97 ↑	2	1.5	1	0.8	3	1.1
<b>Total</b>	<b>133</b>	<b>100</b>	<b>127</b>	<b>100</b>	<b>260</b>	<b>100</b>



**Figure 2.** Distribution of body length of 12-month-old infants.

**Table 3.** Percentile distribution according to head circumference of 12-month-old infants.

Percentile (%)	Girl		Boy		Total	
	n	%	n	%	n	%
<3	2	1.5	2	1.6	4	1.5
3	--	--	3	2.4	3	1.2
3-10	6	4.5	5	3.9	11	4.2
10	--	--	--	--	--	--
10-25	8	6.0	9	7.1	17	6.5
25	1	0.8	1	0.8	2	0.8
25-50	1	0.8	28	22.0	29	11.1
50	37	27.8	--	--	37	14.2
50-75	1	0.8	27	21.2	28	10.8
75	2	1.5	9	7.1	11	4.2
75-90	21	15.8	7	5.5	28	10.8
90	2	1.5	3	2.4	5	1.9
90-97	23	17.2	25	19.7	48	18.5
97	8	6.0	7	5.5	15	5.8
97 ↑	21	15.8	1	0.8	22	8.5
<b>Total</b>	<b>133</b>	<b>100</b>	<b>127</b>	<b>100</b>	<b>260</b>	<b>100</b>

sin, 1 (3.57%) because of the tradition of waiting to hear the call to prayer three times before feeding the baby, and 1 (3.57%) because of having Hepatitis B. Because colostrum contains immunoglobulins, neutrophils and macrophages, and materials protecting the baby from infections, it is an important nutrient for the infant to begin a healthy life and it is also a first nutrient which affects the baby's growth.<sup>5,15</sup> It is good to see that most of the mothers did intend to feed their infants colostrum. In the study by Öktem, Öztürk, Beydilli (1997), 9% of mothers stated that it was appropriate to wait to hear the call to prayer three times before breast feeding.<sup>16</sup> Although our findings are not similar, they are nevertheless significant for practical applications.

When we studied the time of suckling after birth, 102 (41.63%) of mothers fed their babies during the first 45 min, 69 (28.16%) between 45 min and 3 hours and 25 (10.20%) one day later. The Health Study of the Turkish Population (TNSA) in 1993 stated that the percentage of babies being breast fed in the first hour of life was the lowest in Eastern Anatolia (17%). It was determined that only 30% of babies were fed on the first day in the Eastern Anatolian region.<sup>9</sup> In this study, the rate of breast feeding in the first day is 83.3% and non-feeding is 16.7%. The rate of breast feeding on the first day is higher in Malatya compared with that in Eastern Anatolia. In a study carried out in Isparta (1997) by Öktem et al., it was reported that 13% of mothers fed their babies only after 24 hours.<sup>16,24</sup> This finding is similar to the study.

Achievement of head-neck control, development of hand-eye coordination, the baby's ability to keep in touch with its mother and its environment, beginning to sit, and the development of chewing and swallowing coordination are the steps that must be made in order to start weaning. Metabolic and neurological development in the infant makes it possible to feed additional nutrients around 4-6 months.<sup>17</sup> The 4-6 month-period is the time when the infant learns to chew, but if this skill is not learned, it may cause serious nutrition problems.<sup>17,18</sup>

According to the distribution of findings about beginning weaning, it was found that yogurt, cheese etc. as additional nutrients which substitute for milk, started to be given at  $5.4 \pm 2.3$  months, eggs at  $7.0 \pm 2.0$  months, vegetable soup and vegetables at  $6.8 \pm 2.0$  months, fresh fruit juice and fruit at  $6.0 \pm 2.0$  months, and meals with minced meat at  $8.5 \pm 2.0$  months. However, dairy products such as yogurt, cheese etc. as additional nutrients which substitute for milk should be given from 4-6 months, egg from 4-6 months, vegetable soup and vegetables from 4-6 months, fruit from 4-6 months and meals with minced meat from 6-9 months.<sup>19,20</sup> In every period of childhood, children should be fed

sufficiently in variety and amount.<sup>21</sup> Breast-milk becomes insufficient to supply the baby's nutrient needs after 4-6 months. Babies must be transferred from feeding on mother's milk to a mature type of feeding without trouble by adding additional nutrients gradually, so mothers should be informed about the time of starting additional nutrients and the type of nutrients that the infant should take.

When mothers were asked how they followed the growth of their infants, 64.6% of them said that they observed it from their clothes, and 16.1% said from their body weight. When they were asked the same question concerning the development of their infants, 36.1% said they understood it from the babies' ability to sit and walk and 17.3% mentioned their speaking ability. Mothers should know the stages of growth and development of their infants.

According to the Health Study of the Turkish Population (TNSA) in Eastern Anatolia, 10% of all children had low body weight and 2% of them were dramatically under-weight.<sup>9</sup> This is similar in that 1.9% of all 12-month-olds were under the 3% percentile in our study. As was found in the study by Kıyak, the body weight of boys was better.<sup>22</sup> In the same study, 24.8% of girls and 18.5% of boys were under the 25% percentile in terms of body-weight. The finding in the present study that 18% of girls and 7.8% of boys were under the 25% percentile contrasts with the study previously mentioned. Nevertheless, girls are still more likely to be at a lower weight.

In the study by Kıyak (1992) in which the assessment of the physical development of infants who were taken to private health centers in Karşıyaka, İzmir, was measured, 19.0% girls and 15.5% of boys were under the 25% percentile.<sup>22</sup> In our study, since 15.7% of girls and 19.7% of boys were under the 25% percentile, they differ from this study.

Today, it is well known that mothers have an important role in monitoring the growth of their infants. From previous experience, when follow-up charts were kept by mothers, many were lost or torn. However, if mothers were involved in the assessment process of the curve in infant's growth and the decision mechanism about the action to be taken, it would give them responsibility in the follow-up of infants after the measurements were recorded during the follow-up period. Thus, the mother would be keen on monitoring her infant, and consequently the implementation of any concerns and recommendations would be readily put into effect. Besides, this application would be an encouraging factor for the mother to include her infant in the follow-up process.<sup>18</sup>

When mothers were asked if their babies could sit without support in the sixth month, 42.8% of them said yes, but 57.2% said that they only could sit without

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support in later months. While 84 babies (32.3%) in the study were crawling within the seventh month, 176 (67.7%) did not do so until later. Babies in the samples began crawling at  $8.18 \pm 1.3$  months. In this study, most of the babies were crawling within the expected 6th to 8th month period.

In this sample, 97.7% of mothers were reported to have spoken to their babies. When asked, the mothers stated that 85% of the infants used words such as “dad” when they saw their fathers, “food” when they were hungry, and “water” when they were thirsty. 92.3% of mothers said that they played with their babies. In the aspect of social, motor, and emotional development, all children need to play games and to have the stimulation which is necessary for their development.<sup>12</sup> That mothers should play with their babies is a necessity for their development. In this study, most of the mothers did so.

The babies were asked to give their toys and 77.3% of them did so. 85.8% of them waved their hands. When mothers were asked if the infants rocked on hearing music, the answers were that while 94.6% did so, the rest did not respond. When they were asked whether or not their babies stopped upon such commands as “don’t” or “no”, 93.5% said they did.

81.5% of babies kept a standing position without holding on to anything. 93.8% of them could move when they held on to something. When we studied whether infants could step when one hand was held, 80.4% were able to do so. When they were given an

object, 49.2% of them used their thumb and forefinger to grasp it. 86.9% of the babies in the study clung to their mothers in a strange environment. It was reported that 96.9% of the infants displayed their happiness when their behavior was approved. 89.2% of them embraced and kissed when requested. For an ideal development, infants need emotional support. Parents and those who take care of infants are of crucial importance in terms of fulfilling and responding to infants’ needs, wants, and behavior.<sup>12</sup>

Rocking to the rhythm of music, ceasing a movement or an activity when asked, controlling their position, saying a few words, clinging to their mothers in an unfamiliar environment, and displaying their pleasure at approval are consistent with the optimal outcome of growth and development of an infant at 12 months of age.<sup>1,23,24</sup> The majority of infants were consistent with the expected norms.

With the assumption that mothers who were well informed about the importance of growth and development would be more sensitive to the needs of their children, they were asked if they had any such knowledge. 48.1% of them stated that they were informed while 51.9% said no. Mothers who had been informed by elder relatives were 35.2% and those informed by nurses at local clinics were 29.5% (Table 4). According to the study by Genç et al. (1997) in Malatya, most mothers (21.1%) were informed about it by elder family members. These findings resemble our study.<sup>25</sup> These findings show the need for care

**Table 4.** Findings related to mothers’ knowledge about growth and development of infants.

<b>Knowledge of mothers about growth and development of infants</b>	<b>n</b>	<b>%</b>
Informed	125	48.08
Uninformed	135	51.92
<b>Total</b>	<b>260</b>	<b>100.00</b>
<b>Sources of mothers’ knowledge about growth and development of infants</b>	<b>n</b>	<b>%</b>
Their elders	49	35.25
Nurses/Midwives	41	29.50
Doctor	16	11.51
TV, radio etc.	9	6.47
Other	24	17.27
<b>Total</b>	<b>139*</b>	<b>100.00</b>

\*n value is different because this question had many answers.

**Table 5.** Study of mothers’ information about infants’ growth and development and taking infants with no apparent illness for routine health examinations.

	<b>Taking the infants to routine health examinations</b>					
	<b>Yes</b>		<b>No</b>		<b>Total</b>	
<b>The knowledge of infants’ growth and development</b>	<b>n</b>	<b>%*</b>	<b>n</b>	<b>%*</b>	<b>n</b>	<b>%**</b>
Informed	73	58.4	52	41.6	125	48.1
Uninformed	54	40.0	81	60.0	135	51.9
<b>Total</b>	<b>127</b>	<b>48.8</b>	<b>133</b>	<b>51.2</b>	<b>260</b>	<b>100.0</b>

\* Percentage of Row  
X<sup>2</sup>=8.794

\*\* Percentage of Column  
SD=1 p<0.05

providers to be well-educated and experienced, in order to provide good information to families.

The difference between mothers' being informed about infants' growth and development and infants' being brought to routine health checks was found to be statistically significant in favor of those who were informed ( $p<0.05$ ). While 73 (58.4%) of mothers who had knowledge took their infants with no apparent illness for routine health checks, 54 (40%) of the rest who had no knowledge did so (Table 5). It is well known that the mothers' educational level plays an important role on the infant's growth and development.

Due to the fact that mothers' being informed about growth and development of infants has a direct link with taking their babies for health checks, mothers must be informed about the subject.

## RESULTS

Mothers who were informed about baby growth and development were compared to mothers who were not. Results showed that 58% of mothers who were informed about baby care and 40% of non-informed ones took their babies to routine health checks ( $p<0.05$ ). Due to the fact that mothers' level of information on growth and development of infants has a direct link with their taking babies to health checks, mothers must be informed on the subject.

Children need stimulation and emotional support for ideal growth. Parents and other people who are responsible for taking care of babies have an important role in responding to the babies' behavior and needs. For this purpose, since parents need to be well-educated, experienced, and effective, nurses providing the service must be taken into a detailed, practical and continuous training program so as to enable the process of monitoring of growth and development, which is of vital importance in the protection and maintenance of infant health.

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